

# DOCUMENT RESUME

ED 071 266

EC 050 874

**TITLE** Me and My Environment. Unit III: Energy Relationships in My Environment.

**INSTITUTION** Biological Sciences Curriculum Study, Boulder, Colo.

**SPONS AGENCY** Bureau of Education for the Handicapped (DHEW/OE), Washington, D.C.

**PUB DATE** 72

**NOTE** 327p.

**EDRS PRICE** MF-\$0.65 HC-\$13.16

**DESCRIPTORS** Biology; \*Class Activities; \*Curriculum Guides; \*Educable Mentally Handicapped; \*Environmental Influences; \*Exceptional Child Education; Guidelines; Inquiry Training; Instructional Materials; Lesson Plans; Mentally Handicapped; Problem Solving; Student Behavior

## ABSTRACT

Presented is the experimental edition of Unit III: Energy Relationships in My Environment, which consists of 25 life science curriculum activities intended for the 13-to-15-year-old educable mentally retarded child. The curriculum guide is being used in the final field test prior to revision. Stressed throughout the program are ecological themes, inquiry skills, problem solving skills, environmental elements, and applicational behaviors and attitudes. Five to eight activities for each of the four core study areas within Unit III are given of which the following are examples: growing plants, chemical energy, measuring energy values, the food chain game, and the green machine. Activities are organized into materials, teaching strategies, and anticipated student behaviors. The four cores consider an introduction to energy, energy in food, energy flow through food chains and webs, and food making in plants. The ecological theme developed is the complementarity of organisms and environment. Inquiry skills seen to be developed are comparing and translating. Two problem solving skills emphasize are explaining and defending. The environmental element considered is energy. A desired behavior outcome is recognition of the child's dependence on his biological environment. (For related curriculum guides see EC 050 871 through EC 050 873 and EC 050 875.) (DB)

ED 017 122



**Biological Science**



**Unit III:  
Energy Re  
in My Env**

**Experimental Edition 1972-1973**



## **Biological Sciences Curriculum Study**

### **Unit III: Energy Relationships in My Environment**

1972-1973



## Me and my Environment

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## Me and my Environment

### BSCS STAFF

WILLIAM V. MAYER  
Director

MANERT H. KENNEDY  
Associate Director

GEORGE M. CLARK  
Assistant Director

KEITH L. BUMSTED  
Business Manager

### STAFF CONSULTANTS

JAY E. ANDERSON

DOROTHY S. CURTIS

JAMES S. ECKENROD

ROY O. GROMME

FAITH M. HICKMAN

JILL R. NAGRODSKY

FREDERICK A. RASMUSSEN

JAMES T. ROBINSON

NORRIS M. ROSS, JR.

HAROLD A. RUPERT, JR.

JOE M. STEELE

RICHARD R. TOLMAN

### ILLUSTRATION STAFF

ROBERT F. WILSON  
Art Director

ESTER A. BAUTISTA

JUDITH A. BUCHER

SUE E. HARTLEY

CAROLE L. JENCKS

GLORIA M. KROEGER

ARNE L. LUDVIGSEN

ANN L. MANNERING

WAYNE E. MEINEKE

MICHAEL J. O'NEIL

LAWRENCE A. STRAN

JOHN B. THORNTON

ROY M. UDO

BSCS STAFF**BSCS**STAFF CONSULTANTS

JAY E. ANDERSON  
DOROTHY S. CURTIS  
JAMES S. ECKENROD  
ROY O. GROMME  
FAITH M. HICKMAN  
JILL R. NAGRODSKY  
FREDERICK A. RASMUSSEN  
JAMES T. ROBINSON  
NORRIS M. ROSS, JR.  
HAROLD A. RUPERT, JR.  
JOE M. STEELE  
RICHARD R. TOLMAN

ILLUSTRATION STAFF

ROBERT F. WILSON  
Art Director  
ESTER A. BAUTISTA  
JUDITH A. BUCHER  
SUE E. HARTLEY  
CAROLE L. JENCKS  
GLORIA M. KROEGER  
ARNE L. LUDVIGSEN  
ANN L. MANNERING  
WAYNE E. MEINEKE  
MICHAEL J. O'NEILL  
LAWRENCE A. STRAND  
JOHN B. THORNTON  
ROY M. UDO

SECRETARIAL STAFF

KATHY CAMPASSI  
EUNICE COMBS  
MELISSA COONEY  
ROSALIND FRASCONA  
VETA HARTMAN  
SHIRLEY RUPP  
DONNA SANERIB  
MEREDITH SHIELDS  
KAY SIEBEN  
LYNN ZARINA

LIBRARIAN

JUDITH SCHRAG



## Me and my Environment

Writers and Committees, 1971-73 Experimental Materials

### 1971 Summer Writing Team

19

THOMAS E. ALLEN  
Florida State University  
Tallahassee, Florida

JOSEPHINE A. BENNETT  
Whitehaven High School  
South Memphis, Tennessee

DONALD R. DAUGS  
University of Victoria  
Victoria, B. C., Canada

FLORENCE B. HAAG  
Ida Patterson School  
Eugene, Oregon

CREGG INGRAM  
Southwest Educational  
Development Center  
Cedar City, Utah

JO ANN JEPSON  
Granite Park Jr. High School  
Salt Lake City, Utah

KEITH MORRILL  
South Dakota State University  
Brookings, South Dakota

NORRIS M. ROSS, JR.  
Nicolet High School  
Milwaukee, Wisconsin

WILLIAM G. VOLANTE  
Turkey Hill Middle School  
Lunenburg, Massachusetts

MARTHA M. WILLIAMS  
Kepner Jr. High School  
Denver, Colorado

### Project Advisory Committee

WILLIAM R. REID, Chairman  
University of Florida  
Gainesville, Florida

ROBERT L. ERDMAN  
University of Utah  
Salt Lake City, Utah

WARREN HEISS  
Montclair State College  
Montclair, New Jersey

JERRY H. HUBSCHMAN  
Wright State University  
Dayton, Ohio

EDWARD L. MEYEN  
University of Missouri  
Columbia, Missouri

WALTER AUFFENBERG  
Florida State Museum  
Gainesville, Florida

WILLIAM EDWARDS  
Laramie County Community  
Cheyenne, Wyoming

WREN GREEN  
University of British Columbia  
Vancouver, B. C., Canada

FLORENCE HAAG  
Ida Patterson School  
Eugene, Oregon

JERRY HUBSCHMAN  
Wright State University  
Dayton, Ohio

CANDACE LIGHT  
Hodgkins Jr. High School  
Denver, Colorado

KEITH MORRILL  
South Dakota State University  
Brookings, South Dakota

ALICE OGURA  
Balarat Environmental  
Denver, Colorado



Writers and Committees, 1971-73 Experimental Materials



**BSCS**

1972 Summer Writing Team

G. VOLANTE  
y Hill Middle School  
burg, Massachusetts

M. WILLIAMS  
r Jr. High School  
r, Colorado

Advisory Committee

R. REID, Chairman  
rsity of Florida  
sville, Florida

L. ERDMAN  
rsity of Utah  
Lake City, Utah

HEISS  
clair State College  
clair, New Jersey

M. HUBSCHMAN  
at State University  
on, Ohio

L. MEYEN  
ersity of Missouri  
bia, Missouri

WALTER AUFFENBERG  
Florida State Museum  
Gainesville, Florida

WILLIAM EDWARDS  
Laramie County Community College  
Cheyenne, Wyoming

WREN GREEN  
University of British Columbia  
Vancouver, B. C., Canada

FLORENCE HAAG  
Ida Patterson School  
Eugene, Oregon

JERRY HUBSCHMAN  
Wright State University  
Dayton, Ohio

CANDACE LIGHT  
Hodgkins Jr. High School  
Denver, Colorado

KEITH MORRILL  
South Dakota State University  
Brookings, South Dakota

ALICE OGURA  
Balarat Environmental Center  
Denver, Colorado

JOAN PETERS  
Boulder, Colorado

NORRIS M. ROSS, JR.  
Nicolet High School  
Milwaukee Wisconsin

BSCS Project Staff

JAY E. ANDERSON, 1971-72  
GEORGE M. CLARK, 1971-73  
DOROTHY S. CURTIS, 1972-73  
ROY O. GROMME, 1971-73  
FAITH M. HICKMAN, 1971-72  
H. WAYNE JOHNSON, 1972  
MANERT H. KENNEDY, 1971-73  
JILL R. NAGRODSKY, 1972-73  
NORRIS M. ROSS, JR., 1972-73  
HAROLD A. RUPERT, 1971-73  
JOE M. STEELE, 1971-73  
RICHARD R. TOLMAN, 1971-73

Me and My Environment  
Support Staff

EILEEN BURKE, 1972  
MELISSA COONEY, 1971-73  
JOANNE KLEBBA, 1972  
LYNN ZARINA, 1971-73



## Me and my Environment

### Evaluators

#### Test Teachers, 1972-74 Experimental Edition, Field Tes

JUNE ALLBRANDT  
Lake Junior High School  
Denver, Colorado

ALICE BIGHAM  
Aycock Junior High School  
Raleigh, North Carolina

CECILIA FARMER  
.R. O. Gibson Jr. High School  
Las Vegas, Nevada

SHELDON FINE  
Intermediate School 148  
Bronx, New York

CARL HOFF  
Lafayette Middle School  
Lafayette, Colorado

ALMA JENKINS  
Skiles Middle School  
Evanston, Illinois

MOLLIE KITE  
The Pathfinder School  
Bethel Park, Pennsylvania

VITO LOMBARDO  
F. D. R. Middle School  
Bristol, Pennsylvania

DOUGLAS McCULLOUGH  
L. Y. Cairns School  
Edmonton, Alberta, Canada

EDWARD McNULTY  
Eastwood School  
Kirkville, New York

JOAN McNULTY  
Central Junior High School  
DeWitt, Iowa

EVA REEDY  
Benjamin Franklin Jr. High School  
San Francisco, California

EDWARD SHERMAN  
Intermediate School 131  
Bronx, New York

HOWARD SHIPLEY  
Judsons Hill School  
Morristown, Tennessee

Evaluators



BSCS

st Teachers, 1972-74 Experimental Edition, Field Test II

VITO LOMBARDO

F. D. R. Middle School  
Bristol, Pennsylvania

DOUGLAS McCULLOUGH

L. Y. Cairns School  
Edmonton, Alberta, Canada

EDWARD McNULTY

Eastwood School  
Kirkville, New York

JOAN McNULTY

Central Junior High School  
DeWitt, Iowa

EVA REEDY

Benjamin Franklin Jr. High School  
San Francisco, California

EDWARD SHERMAN

Intermediate School 131  
Bronx, New York

HOWARD SHIPLEY

Judsons Hill School  
Morristown, Tennessee

EDITH SHIPMAN

Pacific Prevocational School  
Seattle, Washington

BETTY SILVERTHORN

Selah Junior High School  
Selah, Washington

JOSEPH SOUSA, JR.

Harrington Way Jr. High School  
Worcester, Massachusetts

HILDA THACH

Pierson Junior High School  
Kansas City, Kansas

SUSAN THOMASGARD

Merrill Junior High School  
Denver, Colorado

MARY WHITE

Shawnee Junior High School  
Louisville, Kentucky

SUE WRIGHT

West Locust Street School  
Wilmington, Ohio



## Me and my: Environment

### Evaluators

#### Evaluation Consultants

PHILLIP BASHOOK  
University of Illinois  
Medical Center  
Chicago, Illinois

ROBERT ENNIS  
University of Illinois  
Urbana, Illinois

JAMES J. GALLAGHER  
University of North Carolina  
Chapel Hill, North Carolina

GENE V. GLASS  
University of Colorado  
Boulder, Colorado

ERNEST R. HOUSE  
University of Illinois  
Urbana, Illinois

JAMES A. JONES  
Syracuse University  
Syracuse, New York

WILLARD JONES  
Rocky Mountain Special Education  
Instructional Materials Center  
Greeley, Colorado

OLIVER KOLSTOE  
University of Northern Colorado  
Greeley, Colorado

MARLYS MITCHELL  
University of North Carolina  
Chapel Hill, North Carolina

DOUGLAS SJOGREN  
Colorado State University  
Fort Collins, Colorado

#### Test Teachers

LARRY ALLEN  
Sentinel High School  
Missoula, Montana

VINCENT ALVINO  
Goleta Valley Junior High  
Goleta, California

DANNETTE BOYLE  
Nevin Platte Junior High  
Boulder, Colorado

JO ANN JEPSON (19...)  
Granite Park Junior High  
Salt Lake City, Utah

STEVE JOHNSON  
Central School  
Missoula, Montana

CANDACE LIGHT  
Hodgkins Jr. High  
Denver, Colorado

CECIL LINDER  
Roosevelt Jr. High  
Eugene, Oregon

RICHARD MATHIS  
Shadowlawn Learning Center  
Arlington, Tennessee

Evaluators



BSCS

Test Teachers, 1971-73 Experimental Edition, Field Test I

JONES  
Columbia University  
New York, New York

JONES  
Mountain Special Education  
Instructional Materials Center  
Boulder, Colorado

KOLSTOE  
University of Northern Colorado  
Greeley, Colorado

MITCHELL  
University of North Carolina  
Chapel Hill, North Carolina

SJOGREN  
Colorado State University  
Fort Collins, Colorado

LARRY ALLEN  
Sentinel High School  
Missoula, Montana

VINCENT ALVINO  
Goleta Valley Jr. High  
Goleta, California

DANNETTE BOYLE  
Nevin Platte Jr. High  
Boulder, Colorado

JO ANN JEPPSON (1971-72)  
Granite Park Jr. High  
Salt Lake City, Utah

STEVE JOHNSON  
Central School  
Missoula, Montana

CANDACE LIGHT  
Hodgkins Jr. High  
Denver, Colorado

CECIL LINDER  
Roosevelt Jr. High  
Eugene, Oregon

RICHARD MATHIS  
Shadowlawn Learning Center  
Arlington, Tennessee

EDWARD McCANN  
Mon Valley School  
West Mifflin, Pennsylvania

WALLIS MOODY  
Cole Jr. High  
Denver, Colorado

MICHAEL RAE (1972-73)  
Granite Park Jr. High  
Salt Lake City, Utah

THOMAS RODGERS  
Frank F. Garside Jr. High  
Las Vegas, Nevada

MARY D. SMITH  
James E. Shepard Jr. High  
Durham, North Carolina

FRED STRICKLAND  
Nathan Weeks Jr. High  
Des Moines, Iowa

CARLA WATTS (1972-73)  
UNC Laboratory School  
Greeley, Colorado

AUGUST ZEITLOW (1971-72)  
UNC Laboratory School  
Greeley, Colorado



## Me and my Environment

### INTRODUCTION

The project to develop a life science curriculum for the educable mentally handicapped (EMH) was originally funded in the summer of 1969 by the Division of Research, Bureau of Education for the Handicapped, United States Office of Education. The project is charged with writing, field testing, evaluating, and disseminating materials dealing with topics in life sciences for the EMH population in our schools.

ME NOW, the BSCS model life science program for educable mentally handicapped youngsters in the 11- through 13-year age-group, has been released and is available from Hubbard Scientific Company of Northbrook, Illinois.

On the basis of the success of the ME NOW program, and in anticipation of meeting further student and instructor needs, the Bureau of Education for the Handicapped has provided the BSCS with a three-year continuation grant to develop model materials for 13- to 15-year-old EMH students. Recognition by the educational community of the need for special emphasis on matters of ecological concern led the BSCS staff to decide early in the project that a

portion of the material would be devoted to environmental studies. The material which is entitled ME NOW

In May 1971, a planning conference was held for the development of ME NOW by the five members of the writing team consisting of one biologist, one field of special education, and two biology teachers; and guidelines covering a target population of 11- to 13-year-olds and the needs of these students. A multidimensional approach to cognitive and affective needs of the child was discussed during the conference, and an objective outline of the existing literature and the needs of handicapped students was developed. The needs of those needs might be met.

Summer, 1971 - Initial writing conference

1971-72 academic year - Initial testing

Summer, 1972 - Revision

1972-73 academic year - Large-scale testing

Summer, 1973 - Revision

1973-74 academic year - Conclusion

## INTRODUCTION



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ters of ecological  
project that a

portion of the materials for EMH students should focus on environmental studies. The time line for developing this new curriculum, which is entitled ME AND MY ENVIRONMENT, is shown below.

In May 1971, a planning conference was held to prepare guidelines for the development of ME AND MY ENVIRONMENT. The conference was attended by the five members of the advisory committee, four of whom are in the field of special education and the fifth is in biology; the project writing team consisting of five special education teachers and five biology teachers; and the BSCS project staff. Conferees developed guidelines covering areas of environmental concern and utility for the target population of children, the characteristics of this population, and the needs of these children that might be met through environmental studies. A multidimensional model incorporating the science content, cognitive and affective behaviors, ecological themes, contextual focus, and needs of the children resulted from the planning conference. Following the conference, the BSCS project staff prepared a proposed content and objective outline for the curriculum. A thorough study was made of the existing literature covering the physical, social, and psychological needs of handicapped adults; the staff then attempted to identify which of those needs might be met by ME AND MY ENVIRONMENT.

Summer, 1971 - Initial writing conference

1971-72 academic year - Initial testing

Summer, 1972 - Revision

1972-73 academic year - Large-scale field test

Summer, 1973 - Revision

1973-74 academic year - Conclusion of field test



## Me and my Environment

### THE ROLE OF THE TEACHER IN THIS EXPERIMENTAL EDITION

This curriculum has been written by teachers; it will be tested and modified by teachers. BSCS has attracted enthusiastic teachers for this development, testing, and modification. Ten of these teachers served as experimental teachers to provide the best possible initial field test of the curriculum. Feedback for the revision depends heavily upon the resourcefulness of these teachers. This means that including:

1. Implementing the strategies and activities exactly as they have been written. Only when the combined curriculum as prescribed are analyzed can its strengths and weaknesses be revealed.
2. Developing a feel for the inquiry strategy, flow of activities, and ultimate student behaviors around this understanding of the rationale of this program, the test teachers must suggest extensions of the activity and invent yet others as needed that would enable their students to achieve the objectives when the specified activity.
3. Providing timely, accurate, and detailed feedback specifying strengths and weaknesses, modification of activity.
4. Contributing to the actual writing of the curriculum in a few of the open-ended situations. We purport to write at spots where we have given you the opportunity to develop a portion of an activity in depth. Not only will it enable us to identify potential writers among the group of test teachers.

The following outline will provide you with an overview of the major components of the program:

	Ecological Themes	Inquiry Skills	Problem Solving Skills	Environmental Concepts
<b>UNIT I. EXPLORING MY ENVIRONMENT</b>  Sensing My Environment Investigating My Environment Landmarks In My Environment	Interrelationships Of Environmental Components	Observing  Identifying	Experimenting  Knowing What The Problem Is And What To Do To Solve It	Space  Shelter





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will be tested and modified by teachers. BSCS has attempted to find highly skilled, flexible, and  
g, and modification. Ten of these teachers served as writers to create the materials. Fourteen  
vide the best possible initial field test of the curriculum. The success of this test in providing  
resourcefulness of these teachers. This means that the test teachers have several responsibilities,

ctly as they have been written. Only when the combined results of all teachers' use of this  
strengths and weaknesses be revealed.

ow of activities, and ultimate student behaviors around which the curriculum is organized. Through  
ogram, the test teachers must suggest extensions of some activities, modifications of others, and  
their students to achieve the objectives when the specified strategies are inadequate.

ack specifying strengths and weaknesses, modifications, alternatives, and student responses for each

riculum in a few of the open-ended situations. We purposely have provided blank pages in the manual  
ty to develop a portion of an activity in depth. Not only will this give ideas to the future writers,  
riters among the group of test teachers.

review of the major components of the program:

s	Inquiry Skills	Problem Solving Skills	Environmental Elements	Applicational Behaviors And Attitudes
f ents	Observing	Experimenting	Space	The student develops:
	Identifying	Knowing What The Problem Is And What To Do To Solve It	Shelter	--a sense of self-identity. --a success syndrome. --an attitude of inquiry.



## Me and my Environment

	Ecological Themes	Inquiry Skills	Problem Solving Skills	En
<b>UNIT II. ME AS A HABITAT</b>  Microbes And Me Disease In People Habitats Environmental Choices And Chances (Drugs, Alcohol, Smoking)	<b>Diversity And Pattern</b>  Complementarity Of Organisms And Environment	Associating  Describing  Comparing	Recording Data  Discussion And Treatment Of Group Data  Organizing Data	Liv (E (A (M
<b>UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT</b>  Introduction To Energy Energy In Food Energy Flow Through Food Chains And Webs Food Making In Plants	<b>Flow Of Energy</b>	Translating  Inferring	Explaining, Defending, Answering Why Questions  Asking Questions  Identifying Variables	Ener (F
<b>UNIT IV. TRANSFER AND CYCLING OF MATERIALS IN MY ENVIRONMENT</b>  Energy And Material Transfer Decomposers In My Environment Garbage And My Environment	<b>Cyclic Nature Of Processes</b>	Applying  Guessing	Identifying Controls  Interpreting Results  Drawing Conclusions	Air



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Inquiry Skills	Problem Solving Skills	Environmental Elements	Applicational Behaviors And Attitudes
Associating	Recording Data	Living Things (Plants) (Animals) (Microorganisms)	--skills in functional, receptive, and expressive communication about his environment.
Describing	Discussion And Treatment Of Group Data		--skills in recognizing environmental landmarks and utilizing these for orientation and mobility.
Comparing	Organizing Data		--a recognition of his social dependence on others and his biological dependence on the environment.
Translating	Explaining, Defending, Answering Why Questions		--an understanding of the interrelationships between environmental components.
Inferring	Asking Questions	Energy (Food Chains)	--skills in employing systematic problem-solving techniques to persistent problems of daily life.
Applying	Identifying Variables	Air	--skills in hygienic personal body care.
Guessing	Identifying Controls		--skills in the selection, preparation, and storage of food.
	Interpreting Results		
	Drawing Conclusions		



## Me and my Environment

	Ecological Themes	Inquiry Skills	Problem Solving Skills	Environmental Concepts
<b>UNIT V. POPULATIONS AND SOCIETIES</b>  Behavior Within Different Social Levels Population Size And Complexity Behavior And Population Density Population Size And Resource Use Population Growth	Finiteness Of Resources   Population Dynamics   Ecological Trade-Off	Speculating   Predicting	Recognizing Problems And Formulating Questions   Designing Experiments	Water   Man

### SOME GENERAL OBJECTIVES

1. To help the mentally handicapped child develop interests, skills, and positive attitudes through experiences with scientific -- especially biological -- concepts.
2. To provide the mentally handicapped child with challenging intellectual activity at a level commensurate with his ability to respond effectively.

3. To aid the child in developing a heightened observational measure of self-concept for his environment.
4. To contribute to the child's social maturity and self-confidence.



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	Inquiry Skills	Problem Solving Skills	Environmental Elements	Applicational Behaviors And Attitudes
ces	Speculating  Predicting	Recognizing Problems And Formulating Questions  Designing Experiments	Water  Man	--an attitude of self-concern, as well as social concern, related to his environment.  --skills in making independent decisions that relate to the quality of his environment.  --a feeling of competence in dealing with his environment.  --a basis for aesthetic appreciation.  --skill that may lead to a hobby or avocation over a lifetime.  --an attitude about and concern for overcrowding and its social and personal implications.

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3. To aid the child in establishing functional modes of living through heightened observation, a well-developed curiosity, an increased measure of self-confidence, and a sense of responsibility to and for his environment.
4. To contribute to the development in the child of a higher level of social maturity and emotional stability that can lead to increased



## Me and my Environment

vocational proficiency, realistic self-concept, creative self-expression, and more effective assimilation into the community.

5. To develop in the child a knowledge of himself in relation to his environment, along with a tendency to apply this knowledge to the tasks of everyday living.
6. To contribute to increased knowledge about the learning characteristics and limitations of the educable mentally handicapped pupil, and about effective strategies for instruction.

### BASIC ASSUMPTIONS UNDERLYING THE DESIGN FOR THE CURRICULUM MATERIALS

In the initial discussions with the special education community, some basic assumptions for the development of the life science materials were identified. These were revised somewhat, based on the development and testing of ME NOW, to form the underlying assumptions for the development of ME AND MY ENVIRONMENT.

1. Ideas must be developed with a minimum of reading on the part of the student.
2. Vocabulary, where possible, should involve functional rather than technical language, although technical names are taught when these may be useful to the student.
3. Entry points should be concerned with concrete, tangible "things," rather than with abstract, intangible ideas or concepts.
4. The classroom environment and the materials should not be cluttered with distractors; however, a variety of perceptual modes and instructional media should be used (e.g., sight, touch, smell, etc.).

5. Activities should on or reinforce a
6. Learning, for the redundancy, and t instructional mat student-watching.
7. An activity must desired behavior;
8. EMH children need oriented instruct
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5. Activities should be developed in small, discrete units that build on or reinforce a concept or skill.
6. Learning, for the EMH student, requires slower pacing, greater redundancy, and time for participation by each student. The instructional materials should be student-doing rather than student-watching.
7. An activity must involve the student in ways of applying the desired behavior; transfer cannot be assumed.
8. EMH children need and can respond effectively to an activity-oriented instructional approach.
9. The curriculum should be designed to provide students with an experience in science as inquiry, through the exploration of their environment.
10. Most teachers of the Educabl. Mentally Handicapped will need specific directions in using inquiry strategies for teaching science concepts.
11. The teachers of the Educable Mentally Handicapped, for the most part, are not science-oriented; therefore, the materials should be specific with regard to science techniques.
12. The materials and methods must allow for attention to individual differences and to specific learning characteristics of the population.
13. To achieve the objectives, designers of the materials should attempt to create a balance between detail and motivation; that is, the amount of minute and abstract detail that can be learned is probably a function of the interest and motivation that can be established to deal with it.



## Me and my Environment

### MAJOR AIMS FOR ME AND MY ENVIRONMENT, A JUNIOR HIGH EMH SCIENCE CURRICULUM

The curriculum includes instruction related to the personal well-being, self-worth, confidence, and successful coping of each person to meet persistent daily life problems. The major aims are:

1. Development in each child of a sense of identity as a person who has some degree of control over and can act on his environment. This will lead to a degree of self-determination based on a rational coping with situations rather on a passive compliance or an impulsive response to problems.
2. Development in each child of a success syndrome. More than anything else, each activity is intended to be a success experience for each child. It is the teacher's responsibility - almost obligation - to see that each child succeeds at a level that is challenging to his abilities and that preserves his self-respect. It is a further responsibility of the teacher to point out his achievement. As a group, the students should help each individual fit what he has done into a pattern of accomplishment.

The curriculum is intended to be intellectually stimulating, and exploratory for each student, and to induce him to become actively involved. It should encourage the following outcome:

3. Development in each child of an interest that could become a hobby or avocation over a lifetime (through an exposure to an array of experiences in science). It is hoped that many children will find some area -- perhaps growing plants, caring for animals, identifying flowers, collecting things, or simply enjoying outings into the country -- that they feel strongly about and can develop some competence or knowledge in. This would provide a means of self-expression, and (perhaps) allow some degree of sharing or involvement with others.

The curriculum is organized around some specific content objectives are:

4. Development in each child of a sense of identity as a person who has some degree of control over and can act on his environment. This will lead to a degree of self-determination based on a rational coping with situations rather on a passive compliance or an impulsive response to problems.
5. Development in each child of a success syndrome. More than anything else, each activity is intended to be a success experience for each child. It is the teacher's responsibility - almost obligation - to see that each child succeeds at a level that is challenging to his abilities and that preserves his self-respect. It is a further responsibility of the teacher to point out his achievement. As a group, the students should help each individual fit what he has done into a pattern of accomplishment.

These are the five over-arching objectives for teachers and guide. A junior high student in the materials expressed what he wanted these kids to improve. He said, 'I want to bring these kids a challenge. I want to make them feel that they are capable. I will try a little harder. I will try it works...Another thing I want to say is, 'down -- try it again.' I want to just the tone of voice. I want to stay in this class. I don't, (when their tone of voice is today?'"

Since the original plan for MY ENVIRONMENT, eight objectives encompass the major ideas that the curriculum developed for the student population. The understanding of which





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The curriculum is organized around eight ecological themes. There are some specific content objectives related to these. The ultimate objectives are:

4. Development in each child of a sense of relationship and empathy with other living things. It is hoped this will lead to a positive regard and caring about what affects them as individuals and as a group, because what affects them affects the community of man.
5. Development in each child of an understanding of environmental conditions that will lead to a sense of responsibility for the environment and actions that protect or improve it.

These are the five overriding aims that should serve as reference points for teachers and guide much of what they plan and do in the classroom. A junior high student in one of the first classes that tested these materials expressed what is needed this way: "I just feel that if we want these kids to improve, and that's the whole idea of it, you have to bring these kids a certain amount of happiness. You have got to make them feel that they are really wanted. If they are wanted, they will try a little harder. That sounds kind of childish, I suppose, but it works...Another thing...always inspire: 'Come on, put your best foot down -- try it again.' You know, things like that. I mean, to me, just the tone of voice makes a difference to me about going out or staying in this class. I just feel that they don't want me -- And they don't, (when their tone says) 'Oh, Eddie! Why did he have to come today?'"

#### ECOLOGICAL THEMES

Since the original planning conference for the development of ME AND MY ENVIRONMENT, eight ecological themes have emerged which seem to encompass the major ideas and concepts (i.e., the science content) that the curriculum development team sees as appropriate for this student population. These themes are broad generalizations, some understanding of which appears to be a prerequisite for coping with



## Me and my Environment

one's own environment as well as with society's environmental problems. The themes are probably best thought of as unifying threads which run throughout the curriculum.

### 1. INTERRELATIONSHIPS OF ENVIRONMENTAL COMPONENTS.

"When we try to pick out anything by itself, we find it hitched to everything else in the universe." -John Muir

Life is entirely dependent upon the things that the environment supplies: air, water, food, shelter, and subtle things such as a suitable temperature and humidity. Animals depend upon other animals or plants for food. Scavengers (carrion and detritus feeders) and decomposers (bacteria and fungi) obtain their nutrition from the remains of living organisms. Green plants depend upon sunlight, air, water, and minerals from their environment and form the base upon which all organisms are interconnected by food chains and complex food webs.

Organisms interact with each other, and with the environment, in a variety of ways in addition to the eater-eaten relationships of food chains or webs. Plants compete with each other for light, water, soil nutrients, and growing space. Animals compete for available food resources, space, and shelter. Other relationships include parasite-host and pathogen-host interactions.

The important consequence of this theme is that actions are not singular, nor do they have singular impact. Man's competitive interactions have far-reaching, often unknown consequences. For example, clearing land for raising agricultural crops destroys the habitat for plants and animals and disrupts certain food webs, while establishing suitable habitat for agricultural species. The resulting monocultures are often vulnerable to attack by pests because populations

of natural predators competitive organisms exacerbate the situation. Similarly, herbicides crops may destroy habitats. applications of insecticides nontarget beneficial large-scale, indiscriminate actually decrease agricultural transport, and application of air and water pollution resources upon which of a myriad possibilities terms of consequences ciate that life depends simple actions may have

### 2. DIVERSITY AND PAT

There is great diversity and topography generate communities of plants are adapted to perform there is diversity. diversity. Recognizing the functioning and interaction within the biosphere.

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of natural predators have been removed. Attempts to control these competitive organisms through applications of pesticides may simply exacerbate the situation by killing nontarget organisms such as predators, scavengers, and decomposers which are actually beneficial. Similarly, herbicides used in control of weeds which are competing with crops may destroy habitats for natural predators, making additional applications of insecticides necessary; these in turn may kill more nontarget beneficial organisms. Numerous studies have shown that large-scale, indiscriminate use of pesticides may, in the long run, actually decrease agricultural productivity. In addition, manufacture, transport, and application of pesticides and fertilizers contribute to air and water pollution, thereby adding to the degradation of vital resources upon which all life depends. This is but one simple example of a myriad possibilities. If we expect students to start thinking in terms of consequences, it is imperative that they realize, and appreciate that life depends upon interrelationships and that apparently simple actions may have far-reaching implications.

## 2. DIVERSITY AND PATTERN.

There is great diversity in the environment. Differences in climate and topography generate different environments made up of different communities of plants and animals. Plants and animals differ as they are adapted to perform different functions. Even within a species there is diversity. But, it is possible to find patterns within that diversity. Recognizing patterns helps one conceptualize and understand the functioning and interrelationships of all environmental elements within the biosphere.

If one looks at the organisms in any habitat, he discovers a variety of sizes, shapes, and colors. Further examination will reveal groups of organisms that are related in various ways, e.g. some produce food (producers) while others feed upon these producers (consumers). We



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find that the organisms are all related in a pattern forming a food web.

Diversity is thought to enhance the stability of a system, for it provides alternate channels of energy or materials flow if part of the system is lost or overburdened. For example, consider a single food chain: plants, grasshoppers, frogs, snakes. If one link in the chain is lost, e.g. the grasshoppers are wiped out by insecticides, all links beyond that one will also be lost if they have no alternative sources of food. In a complex food web, however, a link may be lost without destroying the system; links beyond the missing one may turn to another channel for food (e.g., the frogs may exploit another type of insect food resource). Thus, preserving diversity may be necessary in preserving the stability of the life support system of the biosphere. Man cannot exist alone.

It is often said that variety is the spice of life. Diversity makes the environment less monotonous and more interesting. This aesthetic component should receive emphasis in the curriculum.

### 3. COMPLEMENTARITY OF ORGANISMS AND ENVIRONMENT.

A complement is something that completes or fills out something. Complementarity in this context refers to the completion brought about by interrelationships which are dependent upon one another. A few examples should clarify the meaning of this theme.

Organisms use material things from the environment and, in turn recycle things to the environment which may be used by other organisms. Thus, the presence of organisms modifies the environment in various ways, some of which make the environment more suitable for other organisms. Plants use carbon dioxide and release more oxygen than they use. Consumer

organisms (animals, etc.) Both the producers and these resources, and the system is likewise dependent upon them.

Without scavengers and decomposition of the remains of organisms, the environment. Probably essential elements would have come to a screeching halt.

The presence of plants and helps prevent erosion and the rate of evaporation from the atmosphere. Thus, plants influence local climate.

Plant succession is a process where, in a field, new roadside, or other area, hardy pioneer plants which die, and decay, they are replaced by plants which are better suited to the environment. In turn, cause further modification of the environment, finally a relatively stable environment. It is itself and that is in the process of communities are usually.

### 4. FLOW OF ENERGY

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organisms (animals, decomposers) use oxygen and release carbon dioxide. Both the producers and consumers are dependent upon the environment for these resources, and the balance of these materials in the environment is likewise dependent upon both groups of organisms.

Without scavengers and decomposers there would be a prodigious accumulation of the remains of once living organisms cluttering up the environment. Probably all of the available carbon, oxygen, and other essential elements would be tied up in these dead remains. Life would have come to a screeching halt a long time ago!

The presence of plants improves the water-holding capacity of a watershed and helps prevent erosion of the soil by wind and water. Plants reduce the rate of evaporation of soil water but at the same time release it to the atmosphere. Thus, plants play a vital role in the water cycle and influence local climates through the regulated flow.

Plant succession is a classic example of complementarity. An abandoned field, new roadside, or similar disturbed area is quickly invaded by hardy pioneer plants which we usually think of as weeds. As these grow, die, and decay, they modify the immediate environment and are replaced by plants which are better adapted to the new conditions. These, in turn, cause further modifications and are replaced by other populations; finally a relatively stable community exists that is able to replace itself and that is in dynamic equilibrium with the environment. Such communities are usually referred to as climax communities.

#### 4. FLOW OF ENERGY

"The biotic stream is capable of flowing in long or short circuits, rapidly or slowly, uniformly or in spurts, in declining or ascending volume. Ecology calls this sequence of stages in the transmission of energy a food chain, but it



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can be more accurately envisioned as a pipe line---(which) leaks at every joint." -Aldo Leopold.

Energy may be defined as the capacity to do work. To cause movement requires energy; indeed, to do anything requires energy. Life depends upon this continuous flow which is initiated by a constant input of energy from the sun, its photosynthetic transformation from light to chemical energy by the producer organisms (green plants), its passage from organism to organism along various food chains, and its eventual loss as radiant heat to outer space. Each time that energy is converted or transformed at each step along the way, some of it is lost from the system and is no longer available to do useful work. This, in simple terms, is the second law of thermodynamics. Green plants are able to fix photosynthetically only a portion of the sun's energy that they intercept. In turn, some of the energy which they trap and store is used by the plants for such things as growth, reproduction, and the movement of materials. Thus, only a portion of that original stored energy is available to the organisms which eat the plants. These organisms likewise use energy in their various life processes so that only a small portion of the energy which they received from eating plants is available to their predators. As a consequence, only about one-tenth of the energy at any step in a food chain is available to the next level. An acre of agricultural land will provide enough food energy for about 1.5 persons for a year if planted in wheat, but will feed only 0.1 person if used to raise beef cattle!

Society's use of fossil fuels is simply a utilization of energy captured and stored over millions of years by green plants. As such, this source of energy is in finite supply and is a nonrenewable resource. Electricity generated by fossil-fuel burning plants can similarly be traced to the sun. Hydroelectric plants offer a limited

alternative source of of the limited number (which is simply a duplicate place on the sun to receive alternative source of all others, is governed once released, flows to space as heat. This is technology of the breeding exploitation of nuclear and problems. How can generated? Can the energy generated? What effect organisms?

It should be emphasized present, of replacing In the foreseeable future sun, through photosynthesis

### 5. CYCLIC NATURE OF P

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alternative source of electricity. This source is also finite because of the limited number of adequate sites. The use of nuclear reactors (which is simply a duplication on earth of the natural processes taking place on the sun to release energy) to generate electricity offers an alternative source of energy for society; this source, however, as are all others, is governed by the laws of thermodynamics. The energy, once released, flows through the system and is eventually lost to space as heat. This source is also finite, but refinements in the technology of the breeder reactor may make it a very large source. The exploitation of nuclear energy is fraught with unanswered questions and problems. How can we safely dispose of the radioactive wastes generated? Can the earth dissipate the huge amounts of waste heat generated? What effects will this heat have on climates, ecosystems, organisms?

It should be emphasized that nuclear energy offers little hope, at present, of replacing the sun as a life-supporting source of energy. In the foreseeable future, man's only source of food energy will be the sun, through photosynthesis of green plants.

#### 5. CYCLIC NATURE OF PROCESSES.

"All the rivers run into the sea, yet the sea is not full."  
-King Solomon

In contrast to energy, materials (matter) are continuously cycled from living to nonliving systems. Materials necessary for life are in finite supply, and if they were not constantly cycled, life would simply run out of resources and cease. Some examples include the water cycle, the carbon dioxide-oxygen cycle, the nitrogen cycle, and the cycling of various essential minerals such as calcium, potassium, sulfur, and magnesium. Decomposer organisms play a most vital role in many of these cycles, releasing materials which have been incorporated into living organisms so that they are once again available to other organisms in the environment.



Man's present exploitation of consumable resources, in most cases, upsets these natural cycles. The manufacture and ultimate discarding of nonbiodegradable products removes important elements and compounds from the natural cyclic processes of the ecosphere and could ultimately lead to the exhaustion of such resources for the life support system. Burning of fossil fuels is changing the natural balance of oxygen and carbon dioxide in the atmosphere, with the consequences largely unknown. Degradation of air and water through pollution and the application of pesticides destroys organisms which are vital to cyclic processes.

#### 6. FINITENESS OF RESOURCES.

To paraphrase Barry Commoner: Everything has to come from somewhere. The earth has been likened to a spaceship because of its finite supply of all material resources. Inasmuch as life depends upon a continued supply of resources, things have to be used over and over. Continued exploitation of any resource will lead to its exhaustion unless that resource is recycled. The demands of today's technological societies are placing tremendous burdens on the earth's resources and, at the same time, the wastes generated are making other resources unavailable or unfit for supporting life. Projections indicate that we will have depleted our supply of fossil fuels and several important metals resources early in the next century.

Through photosynthesis, food is a renewable resource so long as the natural cycles are able to resupply the raw materials necessary, and so long as environmental conditions necessary for plant life are maintained. But, the amount of food that can be produced on the earth at any one time is finite! There is only so much area available, only so much sunlight that can be intercepted, and only so much of the required raw materials available.

The consequence of this theme is that an indefinite continuation of growth and an increasing use of resources is impossible when the supply

of all resources is finite. The rate of resource utilization, resource utilization per person, and other parameters which are used in the models indicate that growth. Most of us will

#### 7. POPULATION DYNAMICS

A population refers to a group of individuals occupying a given space. The size of a population is determined by four factors: birth rate, death rate, immigration, and emigration. The population grows exponentially (e.g., 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024, 2048, 4096, 8192, 16384, 32768, 65536, 131072, 262144, 524288, 1048576, 2097152, 4194304, 8388608, 16777216, 33554432, 67108864, 134217728, 268435456, 536870912, 1073741824, 2147483648, 4294967296, 8589934592, 17179869184, 34359738368, 68719476736, 137438953472, 274877906944, 549755813888, 1099511627776, 2199023255552, 4398046511104, 8796093022208, 17592186044416, 35184372088832, 70368744177664, 140737488355328, 281474976710656, 562949953421312, 1125899906842624, 2251799813685248, 4503599627370496, 9007199254740992, 18014398509481984, 36028797018963968, 72057594037927936, 144115188075855872, 288230376151711744, 576460752303423488, 1152921504606846976, 2305843009213693952, 4611686018427387904, 9223372036854775808, 18446744073709551616, 36893488147419103232, 73786976294838206464, 147573952589676412928, 295147905179352825856, 590295810358705651712, 1180591620717411303424, 2361183241434822606848, 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of all resources is finite. This is true of population, food consumption, resource utilization, technology, gross national product, or any other parameter which one chooses to measure. And all noteworthy predictions indicate that we are very rapidly reaching the limits of growth. Most of us will probably experience the dire consequences!

#### 7. POPULATION DYNAMICS.

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A population refers to a collection of individuals of the same species occupying a given space at a given time. The size of living populations is determined by four factors: rate of birth, rate of death, rate of immigration, and rate of emigration. Populations tend to grow geometrically (e.g., 2, 4, 8, 16, 32,...) to the limit (carrying capacity) of their environment as determined by the available food, space, predation, and disease. They then either level off and exist in some fluctuating equilibrium with other populations, or they crash back to some low level. A common misconception is that all biological populations tend to follow the first pattern: growth which is described by an S-shaped curve up to the carrying capacity, followed by a fluctuating equilibrium. There are, however, many biological populations which dramatically overshoot the carrying capacity of their environment and, as resources are rapidly depleted, crash back to a low population level. A blowfly population is a good example of the latter. Upon arrival at a carcass, the population increases rapidly, completely overshooting the carrying capacity or the environment's capacity to sustain the population for any appreciable length of time. As the food resource is quickly depleted, the population crashes back to the low level of a few adult flies who are searching out a new carcass to feed upon.

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The strategy is simple -- exploit the environment for all it's worth while it is here and hope that a few of the many adults produced in the process will survive long enough to make it to the next carcass. There is evidence that the characteristics of human population growth are similar to those described for the blowfly, and our present exploitation of the earth's resources is certainly analogous to the strategy employed

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by the blowfly. While such a strategy may be sound for organisms like the blowfly, it certainly would be disastrous for mankind. The earth is the only carcass that we have.

Since resources are finite, no population can continue to grow forever. The human population has grown geometrically over the past few centuries. Doubling time of the human population is currently less than 35 years, and the most optimistic estimates indicate that this population will exceed the carrying capacity of earth within a century (some suggest that we have already passed the carrying capacity and many demographers and ecologists have predicted a crash in the human population prior to the year 2020). Population control and zero population growth will be accomplished, either by self-imposed means or by natural means. If the latter, it will occur through starvation, disease, war, or lower fecundity. There are no other plausible alternatives!

Perhaps the greatest service that this curriculum could hope to perform is to help this population of youngsters understand the implications of population growth and the necessity for limiting family size. But, to achieve the desired end, the curriculum must provide the students with an understanding of the ways and means by which family size may be controlled. This is one area where individuals can make decisions, can have an influence, and can contribute to the solution of what may be mankind's most pressing problem!

### 8. ECOLOGICAL TRADE-OFFS.

"Every coin has two sides."

As we have seen, all environmental components are interrelated in intricate, complex ways. No action has singular impact, and thus any course of action must be carefully weighed and alternatives considered. Any course of action involves ecological trade-offs.

For example, consider the fact that we enjoy a life style with many labor-saving devices. Electricity is a major resource. Large, we have made many environmental quality improvements. Personal appliances. Production of electrical power will require the use of Montana, exploiting the oil and coal reserves of the state (and the arctic tundra), and the use of nuclear plants. In all of this, we have lost sight of environmental quality.

### INQUIRY PHILOSOPHY

We do not view science as a collection of facts which are gathered together into schemes. We have inquired into facts, not for their own sake, but for their utility in developing which concepts and generalizing strategy.

Inquiry, simply defined, is a process of questioning. For EMH students, as for all students, inquiry is essential to learning. Inquiry is the student's curiosity about his world, his question or problem about his behaviors such as observing, inferring, applying, and creative thinking (discovery).

There are degrees of inquiry. The student is posed and the student



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For example, consider society's use of electricity. Many of us enjoy a life style which is very closely tied to the conveniences and labor-saving devices powered by electricity. The generation of that electricity is a major factor in environmental degradation. By and large, we have made the decision to forego a certain amount of environmental quality to enjoy the leisure and convenience of electrical appliances. Projections indicate that increases in demand for electrical power will require strip mining vast areas of Wyoming and Montana, exploiting oil shale reserves of Colorado, depleting the petroleum reserves of the Alaskan north slope (with the inherent dangers to the arctic tundra), and constructing large numbers of nuclear power plants. In all of these activities, we will trade off various amounts of environmental quality.

#### INQUIRY PHILOSOPHY

We do not view science as a collection of facts, but as a process by which facts are gathered, interpreted, and organized into conceptual schemes. We have included facts, and activities structured to generate facts, not for their intrinsic value but to provide the means through which concepts and generalizations are developed through an inquiry strategy.

Inquiry, simply defined, is finding out why. Inquiry may be defined as a process of questioning, of seeking information, of discovering. For EMH students, as for others, the excitement of discovery adds meaning to learning. Inquiry allows the student a natural avenue for satisfying his curiosity about his world. An inquiry strategy is one which poses a question or problem and then guides students through inquiring kinds of behaviors such as observing, describing, identifying, comparing, associating, inferring, applying, predicting, translating, guessing, speculating, creative thinking (divergent production), and value judging.

There are degrees of inquiry. On one end of the scale, a question is posed and the student, after analyzing the question and applying his



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experiences and background information, answers the question. At the other extreme, the student poses the question after being given a certain amount of background information, and then proceeds to answer the question after being given a certain amount of background information, and then proceeds to answer the question by designing an experiment, conducting the experiment, and interpreting the results.

All degrees of inquiry have a common ingredient: the answer is not given; it is arrived at by the individual after he has analyzed information relevant to the question. The distinction is obvious -- in inquiry strategies the questions are answered by the students and not the instructor.

If knowledge is acquired, at least in part, through an inquiry strategy, then the student should be able to use that strategy in acquiring further information and solving future problems as they arise.

It is assumed that after completion of the curriculum, the student will ask questions that emerge through the interaction of environmental inputs with the experiences we have provided. He will be more able to seek answers to these questions through his ability to acquire and interpret information.

### INQUIRY SKILLS

1. OBSERVING is a fundamental activity of scientists. The accumulation of information which may lead to knowledge comes primarily from what we see, hear, taste, smell, or touch. A major function of this curriculum should be to offer a rich and varied environment of concrete experiences for the students. As students gain experience, accuracy in observing and recording the details of their findings should be increased. Observing should frequently

include an element to heed all of the facts. Opinion, in course, a part of

2. IDENTIFYING involves certain properties. This includes the definition, the previous experience.
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include an element of divergent production by asking the students to heed all of the details, extraneous and otherwise, that they can. Opinion, interpretation, and speculation are not, of course, a part of observing.

2. IDENTIFYING involves the recognition of what something is or of certain properties that make it possible to categorize the thing. This includes the determination and/or matching of a name or definition, the use of a key or guide, or the recall of a label from previous experience.
3. ASSOCIATING involves seeing what things go together -- seeing relationships or recognizing common properties. Associating may be thought of as a prerequisite to classifying, or organizing data or information for some purpose. Grouping (classifying), through associating, may enhance conceptualizing.
4. DESCRIBING involves writing or verbalizing orally all of the relevant observations about a thing so that another individual would be able to use the description to identify the object or share in an event he did not actually experience. Emphasizing description should enhance development of observational skills.
5. COMPARING involves the inspection of two or more objects (events) to note similarities and differences. It is closely related to the student's ability to distinguish between critical differences and to generalize recognizable similarities. This skill could involve the use of referents other than the things compared. It is necessary that one have an understanding of such comparatives as hotter-colder and smaller-larger, as well as a comprehension of their related values, e.g., warmer-cooler and littler-bigger.
6. TRANSLATING is the skill in which recorded observations (data) are expressed in another symbolic form. The conversion of tabular



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information into a graph or of a verbal description into a drawing exemplifies this.

7. **INFERRING** involves drawing a conclusion based on evidence. It requires going beyond the information at hand to describe an effect or answer a question. It involves extrapolation and implication, and is closely related to two of the problem-solving skills: interpreting results and drawing conclusions.
8. **APPLYING** involves the utilization of a learned task or skill in some other situation than that in which the task or skill was originally learned. For example, if a child has learned to orient the top of one map with north, an application would be to orient another map in a similar manner.
9. **GUESSING** is the generation of ideas about outcomes in a data-poor situation. It involves using one's common sense and hunches to make the most informed judgment one can.
10. **SPECULATING** is the process of generating ideas about the nature or outcome of something one has not had the opportunity to observe, but about which one can think based on past experiences. It may be that a great deal is known about the subject, but without having observed it, one must describe the event from imagination.
11. **PREDICTING** is the skill of making informed estimates of what should happen in a given situation, based on knowledge of what enters into the situation and previous experience.
12. **DIVERGENT PRODUCTION** refers to the process of generating as many ideas about something as possible.
13. **VALUE JUDGING** involves more than simply expressing opinions or preferences. It is the comparison of things and the assignment of relative value to them, based upon some set of criteria. In this curriculum, the WHY of valuing should be sought.

Inquiry is finding out WHY is problem solving is a structured sequence of steps, to learn to success, to learn to experiences provided and solve the problem

There are at least three levels of problem solving. The minimum level is the functional ability to complete a task. The next level is the capability of designing a solution. The highest level is the ability to complete a complex package involving many steps, development, etc. The process of problem solving is closely related to the process of organizing the curriculum.

A brief description of the problem-solving skills follows, from the easiest to most difficult.

1. **EXPERIMENTING** is the process of using the opportunity to explore a set of materials, to test a hypothesis, to explore, and to find a solution.

Some examples of environmental problem-solving are: of environmental can be burned, which use thermometers to burning things and balances, etc.





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### PROBLEM SOLVING SKILLS

Inquiry is finding out WHY. The process of finding the answers to WHY is problem solving. The ME AND MY ENVIRONMENT science curriculum is a structured sequence of activities that enable the student, through success, to learn to seek the answers to WHY. It is hoped that the experiences provided in the curriculum will enable the student to face and solve the problems of everyday life, both now and later.

There are at least three levels of mastery of problem solving skills. The minimum level is an awareness of the skill. The second level is the functional ability to perform it. The highest level includes the capability of designing an original experiment and carrying it to completion. It should be borne in mind that problem solving behavior is a complex package involving past experience, motivation, cognitive development, etc. The development of problem solving skills should be closely related to the appropriate inquiry skills, concepts, and other organizers of the curriculum.

A brief description of the intended interpretation of the problem solving skills follows in what we consider to be a hierarchy of easiest to most difficult.

1. EXPERIMENTING is doing something to see what happens. It is having the opportunity to "mess around" with a given piece of apparatus or set of materials, to pursue individual curiosity or interest, to explore, and to find things out.

Some examples of experimenting include: investigating the properties of environmental objects (e.g., which ones will float, which ones can be burned, which are man-made, etc.), having the opportunity to use thermometers or balances, raising a classroom pet or plants, burning things under a pinwheel, having time to experiment with the balances, etc.



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It is important to distinguish between experimenting as we have defined it and the formal aspects of experiment and experimental design. Note that the formal aspects are dealt with as a separate category and that designing experiments is thought to be the most difficult of the problem solving skills.

To encourage development of this skill, instructions such as "ALLOW STUDENTS TO MANIPULATE AND EXPERIMENT WITH THE BALANCES," "CAPITALIZE ON STUDENT INTEREST BY ALLOWING STUDENTS TO OBSERVE AND HANDLE THE PETS," etc., are given to the teacher.

2. **KNOWING** what the problem is and what to do to solve it. Defining the problem and its parts clearly is an important first step in any problem solving situation. We assume that recognition and definition of a problem represents a difficult task for this student population, and has therefore been placed high in the problem solving skill hierarchy. The purpose of this skill is to assist students through many experiences in recognizing that a problem exists, in defining that problem, and understanding how answers to that problem might be obtained. This skill must be emphasized (that is, the problem made explicit) for the logical development of those skills which follow. Here we are concerned that the student know the question under investigation and clearly understand the methods to be used in attempting to answer that question. The materials should emphasize, for both teachers and students, that science is a process of finding answers to questions. There is a subtle difference between telling the student the answer to the question he is investigating (e.g., "To see if it is warmer in the sun or in the shade") as opposed to making it clear what the task focus is (e.g., "To see if there are differences in the temperature of different parts of the environment, and if so, see if we can discover what makes the temperature different in different places").

3. **RECORDING DATA** questions observation and collection. Recording of observations by the investigator to record and interpret them in view of the collection and by the question. Methods of recording sounds, etc.

4. **DISCUSSION AND TREATMENT** A look at the outcome of the investigation and a comparison from another should be made and dialog rather than a monologue of variability of results. The ability to express the results involved here, with the help of observing, identifying, and discussing of cognition. Discussion provides the teacher with a better understanding of the possibilities for further activities to re-emphasize the review.

5. **ORGANIZING DATA** The organization of information makes it easier to understand. Included in this category is the choice of deciding on best methods such as line or bar graphs and representations. The teacher related to data for organizing data often involves relating information





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3. RECORDING DATA questions of science are answerable through observation and collection of data pertinent to the question. Recording of observations is a necessary skill to enable the investigator to recall the observations and discuss and interpret them in view of the question. Included here is the collection and transcription of information called for by the question. Making sketches, notes, taking pictures, recording sounds, recording measurements, etc., are included.
4. DISCUSSION AND TREATMENT OF GROUP DATA -- COMPARING RESULTS  
A look at the outcomes of each student's or student group's investigation and a discussion of why one result may differ from another should emphasize the dynamics of group discussion and dialog rather than recitation and monolog. Discussion of variability of results should assist students in the identification of variables which may influence outcomes. The ability to express or talk about what was done is involved here, with students operating primarily at the observing, identifying, describing, and comparing levels of cognition. Discussion of individual or group results provides the teacher with an opportunity to assess student understanding of the investigation and to recognize possibilities for further investigation, alternative activities to re-emphasize particular concepts, or review.
5. ORGANIZING DATA The ordering and grouping of recorded information makes it easier to interpret and see relationships. Included in this category are tabulation of data, averaging or deciding on best estimates, any visual representation such as line or bar graphs, and pictures or schematic representations. This is the most difficult skill directly related to data for students to become proficient in. Organizing data often involves the inquiry skill of translating information into a different symbolic form.



## Me and my Environment

6. **EXPLAINING, DEFENDING, ANSWERING WHY QUESTIONS** This involves discussion of a more sophisticated level than that previously considered. Explaining should assist in the development of the idea of cause and effect. It implies the students' understanding of the question, the procedures, and some ability to interpret results. Defending encourages confidence in one's procedures and interpretation of outcomes. Answering why questions requires an understanding of the questions and task as well as forcing students to analyze data and make interpretations. In the activity Food For Sleep, such questions as "WHERE DID THE HEAT ENERGY COME FROM?" "HOW DO YOU KNOW?" and "WHY ARE YOU TAKING THE TEMPERATURE OF ALL THREE CONTAINERS?" fall into this category. To answer such questions, the students are often operating at the inference level of cognition.

Specific examples of such questions are included in the guide. It seems particularly appropriate for the teacher to be asking individuals or groups these kinds of questions as they proceed with an investigation. We need to emphasize, by providing questioning strategies, that discussion of this sort with individuals and small groups is an effective method of instruction which provides immediate feedback to the teacher.

7. **ASKING QUESTIONS** This category refers to student questions which are raised as a result of their observations, experiences, and experimenting. Teachers are given examples of the kinds of questions that students may raise and suggestions of how such questions should be dealt with.
8. **IDENTIFYING VARIABLES** Identification of those variables which may influence the outcome of an investigation is necessary if one is to understand the concept of a controlled experiment, if one is to make any sort of an appraisal of the

design of an experiment. To make an intelligent experiment. The teacher must recognize that many factors can influence the results and learn much by the process. This skill is highly

9. **IDENTIFYING CONCEPTS** Identifying variables that are constant can be helpful in understanding a problem.
10. **INTERPRETING RESULTS** Interpreting problem solving. Explicit models deal with the data question asked. Interpretations of data are based on the question; not on the data for further investigation. The temptation of interpretation of data is a common one.
11. **DRAWING CONCLUSIONS** Drawing conclusions. The teacher should encourage conclusions that are based on experimental evidence. Conclusions are not forced conclusions but are conclusions gathered.
12. **RECOGNIZING PROBLEMS** Recognizing problems. Necessary prerequisites for problem solving are understanding the problem, identifying the variables, and identifying the concepts.



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design of an experiment or investigation, and if one is to make an intelligent interpretation of the results of an experiment. The first step toward these goals is to realize that many factors may influence an outcome and to be able to recognize and identify some of these factors. Students can learn much by asking about what affected the results. This skill is highly related to predicting.

9. IDENTIFYING CONTROLS Once the students are able to identify variables that may influence an outcome, the idea that all variables except the one under investigation must be held constant can be developed.
10. INTERPRETING RESULTS This is perhaps the most important of the problem solving skills, and may be the most difficult to develop. Explicit models for teachers and students are provided. They deal with the data collected and interpret it in terms of the question asked. Emphasis is placed on recognizing the limitations of data and that the data may or may not have answered the question; not going beyond the data; and recognizing the need for further investigation. Teachers are cautioned to avoid the temptation of ignoring the data and simply providing "the answer."
11. DRAWING CONCLUSIONS Interpretation of results may warrant drawing conclusions. The emphasis here is on drawing only those conclusions that are supported by the data collected. Some forced conclusions are inevitable because of the difficulty of providing experimental evidence; however, great care is exercised to avoid forced conclusions when an experiment is conducted and data gathered.
12. RECOGNIZING PROBLEMS AND FORMULATING QUESTIONS This skill is a necessary prerequisite for the general application of the other problem solving skills outside the classroom situation. In other



## Me and my Environment

words, if we expect students to apply the problem solving skills above to their daily problems, it seems necessary that they be able to recognize that a problem exists and be able to state an appropriate question. To develop this skill, the students are presented with events or phenomenon that present an identifiable problem, and then given the opportunity to define that problem.

13. **DESIGNING EXPERIMENTS** Once the students are able to recognize a problem and formulate a question, an experiment to answer that question may be designed. The design should include identification of variables and controls, methods for observation, gathering data, organizing and presenting data, etc. It is assumed that this student population will be able to perform this skill only after a great deal of experience with the preceding skills.

### SPECIFYING STRATEGIES FOR INSTRUCTION

The model for inquiry used in these materials demands that the focus of classroom activity be on student involvement with materials and activities. The teacher functions as a catalyst in generating pupil response in the learning situation. The response desired may be attitudinal, cognitive, or psychomotor: verbal or nonverbal. The teacher's behavior also falls in these same categories, but with an important difference: the teacher must be totally conscious of his role as a stimulus, while the student is generally unaware that he is being manipulated by strategy.

To communicate maximally with the teacher, we feel we must carefully describe as much as possible of the pattern of interaction upon which the anticipated results depend. The whole intent of this curriculum would be defeated if this pattern is not understood and implemented. We know, for example, that teachers often fail to allow children the opportunity or the time to think for themselves when a problem is

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We do not anticipate th individual students in provide enough reminders unexpected or unpredict materials are written.

### UNIT GOALS

Unit goals are broad ge of a major portion of t will," is understood in ments that capture the also serve the function are directed.

### CORE OBJECTIVES

The core objectives (st outcomes for sequences to summarize what the s each of the activity se map for the teacher to may also serve as evalu attainment of students.



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tations of things on children rather than allow the children to  
express their own views of things observed. We hope, therefore,  
to provide for teachers a model of strategy in these materials  
that will -- if initially studied and used -- demonstrate the  
benefits we describe for it in terms of pupil response behavior.

We do not anticipate that we can predict all that will occur with  
individual students in the classroom. We hope that we can, however,  
provide enough reminders to the teacher so that he will deal with  
unexpected or unpredicted events in the same mode in which the  
materials are written.

#### LEVELS OF OBJECTIVE STATEMENTS

##### UNIT GOALS

Unit goals are broad general statements that define long-term goals  
of a major portion of the unit. An initial statement, "The student  
will," is understood in each of the goals. They are defined as state-  
ments that capture the intent and emphasis of the curriculum. They  
also serve the function of organizers toward which the core objectives  
are directed.

##### CORE OBJECTIVES

The core objectives (stated in student behaviors) refer to the desired  
outcomes for sequences of activities. The role of these objectives is  
to summarize what the student will be able to do as a consequence of  
each of the activity sequences. The core objectives provide a cognitive  
map for the teacher to extend or elaborate on. These core objectives  
may also serve as evaluative guides to assess short-term progress and  
attainment of students.



## Me and my Environment

### ACTIVITY OBJECTIVES

Activity objectives are enabling or performance objectives that relate to the specific activity. They identify the actions or behaviors students must perform or acquire to insure their success in achieving the broader objectives of the curriculum. The role of the activity objective is to provide the teacher with specific instructional landmarks both to plot the course and to chart student progress. The objectives include information which the student has repeated or restated, experiences he has had, actions he has performed, and products he has made.

### ANTICIPATED STUDENT RESPONSE BEHAVIORS

These focus on specific *actions or interactions occurring during instruction*. They describe what we predict students will do or say in response to some specific strategy.

### TEACHING THE MATERIALS

It is often said that man is a curious animal and that science is a content vehicle to capitalize on this phenomenon.

Science, then, for the EMH student, capitalizes on the student's natural curiosity about himself. Science is exciting, and ME AND MY ENVIRONMENT relies on this excitement. This science program has been designed to fit into the already existing curriculum framework and within individual teaching philosophies.

The amount of time spent on each activity can be tailored to fit the mood of the class and the teacher. An average of 45 minutes may be required for all activities. Some activities will require extensive time, perhaps several days. The main point in teaching ME AND MY ENVIRONMENT is not to hurry -- to allow sufficient time for inquiry to occur.

The ME AND MY ENVIRONMENT take less time. The

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### PLANNING GUIDE

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### OVERVIEWS

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### RATIONALE

Each UNIT and CORE is the why of the particu read, thought about, a to focus on and subsequ students.



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The ME AND MY ENVIRONMENT sequence may span three years, or it may take less time. The pace can be set by the individual teacher.

Particular attention has been given to articulating the science curriculum with the other parts of the instructional program. Sight vocabulary is included in many of the activities, and suggestions given for using these words in spelling and vocabulary lessons. Math skills are an integral part of science, and the lessons provide application of the student's math skills.

#### PLANNING GUIDE

Teaching the materials for the first time will require preparation time. Less preparation time is required after that. The teacher's planning guide will help you prepare materials in advance. For example, if a film is to be ordered, the planning guide will remind you when. The guide should be followed rather rigidly when initiating an activity.

#### OVERVIEWS

Each UNIT and CORE is provided with a summary "roadmap" to give the teacher an insight into the direction or groupings of activities.

#### RATIONALE

Each UNIT and CORE is provided with a section to provide background into the why of the particular material used. These rationales should be read, thought about, and continually referred back to in order for you to focus on and subsequently provide *why intentionality* to your students.





## Me and my Environment

### BACKGROUND INFORMATION

Some pertinent points which are not necessarily developed in the curriculum itself but which will provide you with useful information have been incorporated in this section at the beginning of each CORE.

### REVIEWS TO SUCCESS AND CLUES TO SUCCESS

A portion of the evaluation program during the first field testing of ME AND MY ENVIRONMENT entailed the use of what was basically an objective pretest, administered on the days before beginning instruction on each unit, and an identical posttest administered the days following completion of each unit. The items included in each test were specifically designed to secure information on the students' background knowledge as well as to secure data about the success of the materials. They were not used to evaluate the youngsters.

Because the item designs for use with this student population proved highly effective, many of these questions, along with some situational tasks, have been incorporated into two *instructional assessment sections*. The first of these, "Clues to Success," appears periodically within various activities so that you can have immediate feedback on the effectiveness of the materials and instruction. At this point you have the unique opportunity to determine whether or not your students are ready for the next activity or whether a modification, repetition, extension, or review of certain activities is necessary before proceeding.

The "Reviews to Success" are generally concluding activities in a CORE. They enable you to assess the effectiveness of instruction for the entire CORE and to decide if the students are prepared for the next set of objectives.

### WORKSHEETS

The worksheets in the program are used in a variety of ways: a) as reinforcement to general or specific objectives; b) to introduce

new information and to an activity; d) as a cover in previous lessons on daylight slides. The chalkboard before they

### 35mm SLIDES

This medium broadens inquiry activities. The teacher and by most strategies give specific

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### GAMES

Perhaps the most ambi objectives through the





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new information and to record data; c) to enhance the interest in an activity; d) as a culminating activity to review what has been covered in previous lessons. Difficult worksheets are duplicated on daylight slides. These worksheets should be demonstrated on the chalkboard before they are attempted by the individual students.

#### 35mm SLIDES

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This medium broadens instructional opportunities, especially during inquiry activities. The projected image should be used both by the teacher and by most students during instruction. The teaching strategies give specific instructions for using them.

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You need not completely darken your classroom when using the slides. Your students should be able to write or read at their desks or move from their desks to the board while the slides are being shown. It will be desirable, however, to turn off those lights or darken those windows where the light is reflected directly from the chalkboard.

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The largest possible image is usually best for the students to see clearly. Therefore, place the slide projector as far as possible from the chalkboard, but so that the image projected does not extend above or below the edges of the board.

It is expected that students and teachers will often use chalk to mark directly on the projected image.

Be sure that you are familiar with the operating instructions for the Carousel Projector and that you observe the manufacturer's cautions for insertion and projection of slides, trays, bulbs, and lenses.

#### GAMES

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roduce

Perhaps the most ambitious of the endeavors has been to promote certain objectives through the use of games and game theory. Besides providing



## Me and my Environment

variation to the instructional mode, the games are used to dramatize some of the major concepts in the curriculum, as well as to give experience in cooperation and taking turns.

### BOOKLETS

This medium is used as a variation to the worksheets and 35mm slides. It combines a minimum of reading with cartooned illustrations to present somewhat detailed factual information.

### POLAROID CAMERA

To increase the opportunities for involving all students in the activities, a Polaroid camera has been included as part of the instructional materials. The camera is provided through the courtesy of the Polaroid Corporation.

A camera in the classroom can serve as a valuable motivation device for students, as well as a help in prolonging their ever-so-short interest span. The instant feedback from the pictures is a replay of the actual class activity, a photographic record that can be used to compare before and after conditions, a progress report of growth and development, or an assessment of the learning that took place in an activity. Actually operating the camera, manipulating parts, focusing, developing, and viewing the finished product affords an ego-building experience. Such experiences will help the student develop self-esteem and self-confidence, thus contributing to the development of a success syndrome.



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## Me and my Environment

### MATERIALS

Camera (Polaroid Square Shooter)  
Polaroid film  
Flash cubes  
\*Masking tape  
\*Yardstick  
\*Marking devices  
\*Clock with second hand  
Worksheet 0  
\*Foot ruler

### TEACHING STRATEGIES

#### Floating Activity. Meet The Camera

*Most students will not know how to operate the Square Shooter Camera. A good understanding now of how it works is essential to the successful use of the camera in subsequent activities.*

Begin by saying:

MANY OF OUR CLASS ACTIVITIES THIS YEAR WILL  
REQUIRE TAKING PICTURES. HOW MANY OF YOU  
HAVE EVER USED A CAMERA?

Then ask:

DO YOU KNOW WHAT KIND OF CAMERA THIS IS?  
(Holding up camera.)

If yes, then ask:

HAVE YOU TAKEN A PICTURE WITH A CAMERA  
LIKE THIS?

If a student has operated a Polaroid Camera previously,  
select that student to assist you with the activity.

Say:

THIS CAMERA IS CALLED A POLAROID SQUARE  
SHOOTER. IT MAKES PICTURES THAT YOU CAN



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## TEACHING STRATEGIES

Activity. Meet The Camera

Students will not know how to operate the Square Camera. A good understanding now of how it is essential to the successful use of the camera in all activities.

Explaining:

OF OUR CLASS ACTIVITIES THIS YEAR WILL BE TAKING PICTURES. HOW MANY OF YOU HAVE EVER USED A CAMERA?

KNOW WHAT KIND OF CAMERA THIS IS? (Pick up camera.)

Now ask:

DO YOU TAKEN A PICTURE WITH A CAMERA PREVIOUSLY?

If a student has operated a Polaroid Camera previously, have that student to assist you with the activity.

THE CAMERA IS CALLED A POLAROID SQUARE CAMERA. IT TAKES PICTURES THAT YOU CAN

## ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

- have become familiar with the distance of 3 1/2 feet, 5 feet, and 10 feet.
- have participated in identifying parts of the camera.
- have counted time in seconds.
- have operated the camera in taking a picture.
- have developed a picture.

Students:

--respond by show of hands.

--respond, "Yes," "No," "Don't know."

--respond, "Yes," "No."

**MATERIALS****TEACHING STRATEGIES**

SEE IN ONE MINUTE AFTER THEY ARE TAKEN. THROUGH-  
OUT THE YEAR YOU WILL BE USING IT TO TAKE  
PICTURES OF CLASS ACTIVITIES AND EACH OF  
YOU WILL HAVE A CHANCE TO OPERATE IT MANY TIMES.

At this point have students gather around the camera to  
get a closer look and examine it in order to become more  
familiar with it.

When students are seated once again, distribute Worksheet  
0 of camera parts.

Show and tell about the parts of the camera while the  
students find them on Worksheet 0. Write the name of  
the part on the chalkboard as you discuss it. Have  
pupils say the name. Continue until you have mentioned  
all parts essential to their first effort.

Say:

NOW THAT WE HAVE SEEN ALL THE PARTS OF THE CAMERA  
WHAT ELSE DO YOU THINK WE NEED TO KNOW IN ORDER  
TO WORK THE CAMERA WELL ENOUGH TO GET GOOD  
PICTURES?

If no one implies that it is important  
to know the distance of the object, then  
say:

IN ORDER TO GET A CLEAR PICTURE WE MUST  
KNOW HOW FAR THE OBJECT IS FROM THE  
CAMERA, AND THEN ADJUST THE CAMERA  
TO TAKE A PICTURE.

Refer to Distance Scale on Lens Ring. Say:

THIS IS THE PART THAT SHOWS WHICH DISTANCES  
THE CAMERA CAN ADJUST TO FOR CLEAR PICTURES.  
3 1/2 FEET, 5 FEET, 10 FEET, ETC.

## TEACHING STRATEGIES

ONE MINUTE AFTER THEY ARE TAKEN. THROUGH-  
YEAR YOU WILL BE USING IT TO TAKE  
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L HAVE A CHANCE TO OPERATE IT MANY TIMES.

Have students gather around the camera to  
look and examine it in order to become more  
familiar with it.

Students are seated once again, distribute Worksheet  
parts.

Discuss about the parts of the camera while the  
students read them on Worksheet 0. Write the name of  
each part on the chalkboard as you discuss it. Have  
students write the name. Continue until you have mentioned  
all the parts essential to their first effort.

WHAT HAVE WE SEEN ALL THE PARTS OF THE CAMERA  
WHAT DO YOU THINK WE NEED TO KNOW IN ORDER  
TO OPERATE THE CAMERA WELL ENOUGH TO GET GOOD  
PICTURES?

Does anyone imply that it is important  
to know the distance of the object, then  
say:

IN ORDER TO GET A CLEAR PICTURE WE MUST  
KNOW HOW FAR THE OBJECT IS FROM THE  
CAMERA, AND THEN ADJUST THE CAMERA  
TO TAKE A PICTURE.

Distance Scale on Lens Ring. Say:

THE PART THAT SHOWS WHICH DISTANCES  
THE CAMERA CAN ADJUST TO FOR CLEAR PICTURES.  
ONE FOOT, 5 FEET, 10 FEET, ETC.

## ANTICIPATED STUDENT BEHAVIORS

Students:

--look at camera.

--identify parts of camera on the worksheet.

--give varied responses.

## MATERIALS

## TEACHING STRATEGIES

Show a foot ruler. Ask students to identify it.

Say:

LET'S MARK A DISTANCE THAT IS 3 1/2 FEET LONG  
ON THE FLOOR SO WE CAN TELL HOW FAR THAT  
DISTANCE IS WHEN WE'RE TAKING A PICTURE.

Select a volunteer to assist you in marking off the distance with a foot ruler. Use a piece of masking tape to mark the distance. Reiterate how the ruler is placed end to end to get the distance.

Have students search around the room for objects that are approximately 3 1/2 feet long or that are a distance of 3 1/2 feet away from the next object. Repeat this procedure for 5 feet and 10 feet. Allow plenty of time for students to associate one distance at a time with objects in the classroom.

While one-half of the class continues to familiarize themselves with distances, organize the other half to take turns looking through the view finder on the camera to become acquainted with the black line and red arrow inside. Allow them time to practice taking pictures without shaking the camera (refer to position, page 3 in the camera manual).

When everyone in this group has peered through the view finder and practiced holding the camera steady, switch groups and provide the same experience for the other half of the class.

At a point when all pupils have tried the camera and determined distances, refer to the camera Worksheet once again -- this time the back view.



## TEACHING STRATEGIES

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when all pupils have tried the camera and  
distances, refer to the camera Worksheet 0  
-- this time the back view.

## ANTICIPATED STUDENT BEHAVIORS

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Students:

--respond, "A ruler," "A stick," "I don't know."

--approximate distance and lengths of 3 1/2 feet,  
5 feet, and 10 feet.

--look through the view finder.

--practice judging distance.

xxx

## MATERIALS

## TEACHING STRATEGIES

Say:

WE ARE NOW READY TO PUT FILM IN THE CAMERA.  
(Identify and discuss only the parts the students  
need to use in loading the camera.)

Say:

(Student's name), WOULD YOU LIKE TO HELP ME  
LOAD THE CAMERA?

Follow instructions on HOW TO LOAD FILM on pages 10  
and 11 of the camera manual.

Have the student fit the film pack on the camera,  
close and lock the back.

Since pictures require a specific amount of time to  
develop, it will probably be necessary at this point  
to conduct a session on telling time by the second hand.

Say:

AFTER A PICTURE IS TAKEN, THE FILM REQUIRES  
60 SECONDS TO DEVELOP. LET'S SEE IF WE CAN  
GET AN IDEA OF HOW LONG THAT IS.

Direct the students' attention to the second hand on the  
clock, preferably a wall clock so that all may see at  
the same time. Point out the second hand and tell them  
to watch it go around the clock a few times.

Say:

NOW WE ARE GOING TO COUNT THE AMOUNT OF TIME  
IT TAKES THE SECOND HAND TO GO FROM 12 BACK TO  
12. I WILL TELL YOU WHEN TO START COUNTING.

## TEACHING STRATEGIES

NOW READY TO PUT FILM IN THE CAMERA.  
fy and discuss only the parts the students  
use in loading the camera.)

t's name), WOULD YOU LIKE TO HELP ME  
E CAMERA?

uctions on HOW TO LOAD FILM on pages 10  
e camera manual.

dent fit the film pack on the camera,  
ck the back.

es require a specific amount of time to  
will probably be necessary at this point  
session on telling time by the second hand.

PICTURE IS TAKEN, THE FILM REQUIRES  
NDS TO DEVELOP. LET'S SEE IF WE CAN  
IDEA OF HOW LONG THAT IS.

tudents' attention to the second hand on the  
rably a wall clock so that all may see at  
e. Point out the second hand and tell them  
go around the clock a few times.

ARE GOING TO COUNT THE AMOUNT OF TIME  
S THE SECOND HAND TO GO FROM 12 BACK TO  
WILL TELL YOU WHEN TO START COUNTING.

## ANTICIPATED STUDENT BEHAVIORS

Students:

--assist with loading the camera.

--observe second hand on clock.

## MATERIALS

## TEACHING STRATEGIES

When the second hand approaches 12, signal the class to start counting the seconds softly. When the hand returns to 12 say:

STOP. WHAT NUMBER WERE YOU SAYING WHEN I SAID STOP?

Then say:

IT TOOK 60 SECONDS FOR THE HAND TO GO ALL AROUND THE CLOCK. IT ALSO TAKES 60 SECONDS FOR THE FILM TO DEVELOP. LET'S TRY COUNTING THE SECONDS AGAIN, THIS TIME GOING FROM 3 BACK TO 3.

Repeat the previous procedure.

Say:

NOW WE ARE READY TO TAKE OUR FIRST PICTURE.

Arrange class for a group picture. When the picture is taken, pull film out of camera and have the class count off the 60 seconds of developing time. Peel off the film.

Say:

AS YOU PEEL OFF THE FILM FROM THE PICTURES YOU TAKE, BE CAREFUL OF A JELLYLIKE CHEMICAL ON THE FILM. IT IS IMPORTANT TO KEEP THIS JELLY AWAY FROM YOUR EYES AND MOUTH, AND ALSO AWAY FROM YOUR CLOTHES.

Demonstrate how to fold up the negative. Now proudly show your product to the class.

Say:

## TEACHING STRATEGIES

second hand approaches 12, signal the class to counting the seconds softly. When the hand returns

:

. WHAT NUMBER WERE YOU SAYING WHEN I SAID ?

LOOK 60 SECONDS FOR THE HAND TO GO ALL AND THE CLOCK. IT ALSO TAKES 60 SECONDS THE FILM TO DEVELOP. LET'S TRY COUNTING SECONDS AGAIN, THIS TIME GOING FROM 3 TO 3.

e previous procedure.

WE ARE READY TO TAKE OUR FIRST PICTURE.

class for a group picture. When the picture is all film out of camera and have the class count 0 seconds of developing time. Peel off the

YOU PEEL OFF THE FILM FROM THE PICTURES YOU BE CAREFUL OF A JELLYLIKE CHEMICAL ON THE IT IS IMPORTANT TO KEEP THIS JELLY AWAY YOUR EYES AND MOUTH, AND ALSO AWAY FROM YOUR EYES.

te how to fold up the negative. Now proudly show act to the class.

## ANTICIPATED STUDENT BEHAVIORS

xxxi

Students:

--respond, "60," "I forgot."

**MATERIALS****TEACHING STRATEGIES**

NOW IT IS TIME FOR YOU TO TAKE A PICTURE.

Follow the developing procedures on pages 18 and 19 of the camera manual.

Say:

THE PICTURE YOU TAKE MAY INCLUDE EITHER ONE OR TWO CLASSMATES.

Organize the class for taking pictures. Assist students only when absolutely necessary.

Let the picture taking continue until each student has had an opportunity to take a picture. Let students choose the classmate whose picture he wishes to take.

Heap praise on students for any accomplishments. If a student's photo fails to turn out well, analyze the problem and allow him to try again.

Mention use of flash cubes at the time needed.

As students succeed in taking a good picture give them a gummed label to stick on the back. Each label should include the teacher's name, date, who is in the picture, and what the picture is about. In the comments section identify who took the picture. Make clear that it is the photographer's responsibility to see that every picture he takes is labeled. (He may need to get assistance from you or a classmate.)

## TEACHING STRATEGIES

IS TIME FOR YOU TO TAKE A PICTURE.

Developing procedures on pages 18 and 19 of  
annual.

PICTURE YOU TAKE MAY INCLUDE EITHER ONE  
CLASSMATES.

class for taking pictures. Assist students  
absolutely necessary.

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teacher's name, date, who is in the picture,  
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ssmate.)

## ANTICIPATED STUDENT BEHAVIORS

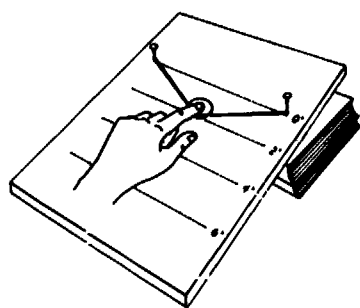
Students:

--take pictures of classmates.

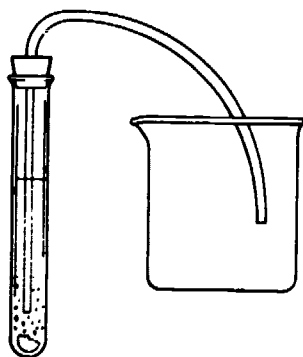


# ENERGY RELA IN MY ENVIR

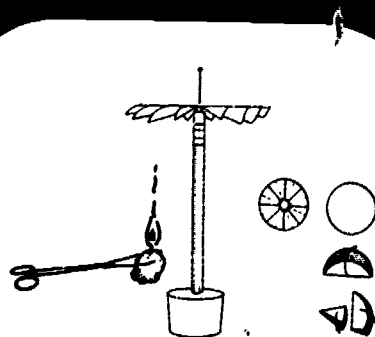
Core A



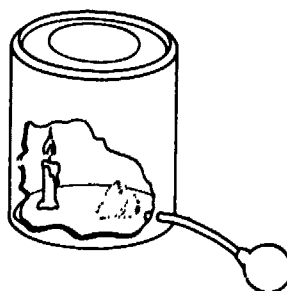
INTRODUCTION TO ENERGY



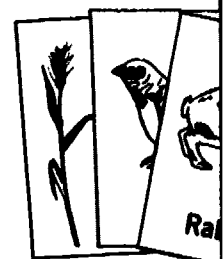
Core B



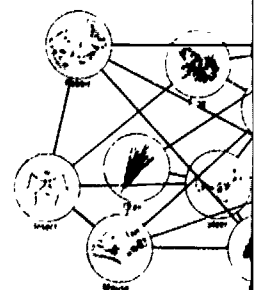
ENERGY IN FOOD



Core C



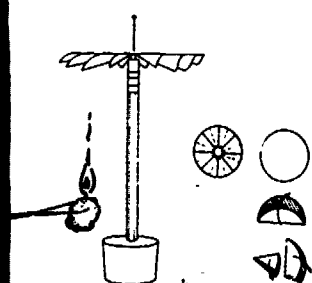
ENERGY FL  
THROUGH FOOD  
AND WEBS



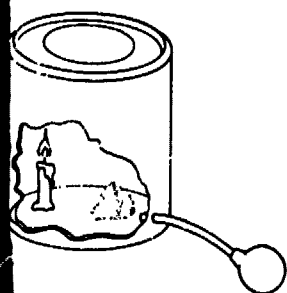


# ENERGY RELATIONSHIPS IN MY ENVIRONMENT

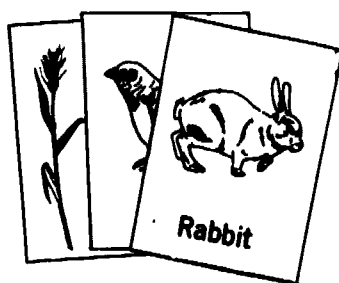
Core B



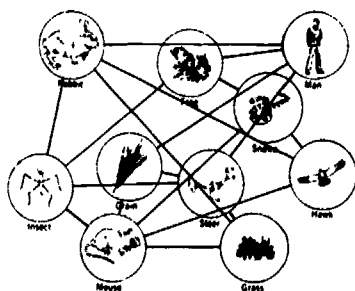
ENERGY IN FOOD



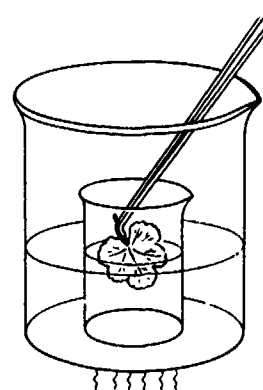
Core C



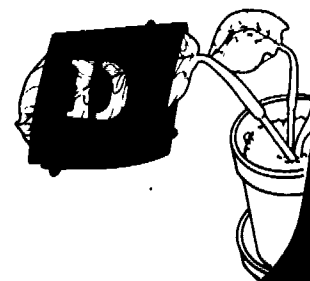
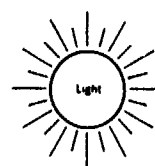
ENERGY FLOW  
THROUGH FOOD CHAINS  
AND WEBS



Core D



FOOD MAKING IN PLANTS





## Me and my Environment

### UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT CORE A. INTRODUCTION TO ENERGY

#### AIMS FOR ME AND MY ENVIRONMENT

1. DEVELOPMENT IN EACH CHILD OF A SENSE OF IDENTITY AS A PERSON WHO HAS SOME DEGREE OF CONTROL OVER AND CAN ACT ON HIS ENVIRONMENT. This will lead to a degree of self-determination based on a rational coping with situations rather than on a passive compliance or an impulsive response to problems.
2. DEVELOPMENT IN EACH CHILD OF A SUCCESS SYNDROME. More than anything else, each activity is intended to be a success experience for each child. It is the teacher's responsibility -- almost obligation -- to see that each child succeeds at a level that is challenging to his abilities and that preserves his self-respect. It is a further responsibility of the teacher to point out his achievement. The students as a group should help each individual fit what he has done into a pattern of accomplishment.
3. DEVELOPMENT IN EACH CHILD OF AN INTEREST THAT COULD BECOME A HOBBY OR AVOCATION OVER A LIFETIME (through an exposure to an array of experiences in science). It is hoped that many children will find some area -- perhaps growing plants, caring for animals, identifying flowers, collecting things, or simply enjoying outings into the country -- that they feel strongly about and can develop some competence or knowledge in. This would provide a means of self-expression, and (perhaps) allow some degree of sharing or involvement with others.
4. DEVELOPMENT IN EACH CHILD OF A SENSE OF RELATIONSHIP AND EMPATHY WITH OTHER LIVING THINGS. It is hoped that this will lead to a positive regard and caring about what affects them as individuals and as a group, because what affects them affects the community of man.
5. DEVELOPMENT IN EACH CHILD OF AN UNDERSTANDING OF ENVIRONMENTAL CONDITIONS that will lead to a sense of responsibility for the environment and actions that protect or improve it.

1. Realize and appreciate the energy
2. Appreciate and understand man's

OBJE

1. Define energy as "anything that c
2. Recognize that the ability to mov
3. Recognize that the amount of and to the amount of energy input.
4. Conclude that energy can be store
5. Recognize different forms of ener

# UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

## CORE A. INTRODUCTION TO ENERGY



BSCS

### UNIT III GOALS

1. Realize and appreciate the energy interrelationships between organisms.
2. Appreciate and understand man's dependence on green plants for food.

### OBJECTIVES OF CORE A

1. Define energy as "anything that causes something to move or change."
2. Recognize that the ability to move or cause movement requires energy.
3. Recognize that the amount of and the rate at which work is done is related to the amount of energy input.
4. Conclude that energy can be stored and later released.
5. Recognize different forms of energy (heat, light, chemical, and electrical).

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## Me and my Environment

### UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

#### CORE A. INTRODUCTION TO ENERGY

##### CORE A RATIONALE

A number of scientific concepts are highly abstract. The notion of energy is one of these. Energy is described as weightless, as not occupying space, and as existing in a variety of forms. Yet nobody really knows what energy is. While the problem of defining exactly what energy is may be rather difficult, the importance of energy to the world ecosystem cannot be overemphasized. The functioning and very existence of all life on Earth is dependent upon a constant supply of energy from the sun. All movements, changes, transformations, and events require energy. Thus understanding and appreciating some basic ideas about energy is prerequisite to understanding one's environment.

The activities comprising this core are intended to familiarize the student with some basic ideas about energy. It is considered essential that each student have as much physical contact with the materials as possible. The student needs to develop a feeling of active involvement rather than watching others perform.

Through a discussion of a simple cork-popping demonstration, a working definition of energy is established: energy is anything that causes something to move or change. This is a nontechnical definition, but certainly adequate for the purposes of this program. The activity attempts to help the students see a need for learning about energy and relate this "new" concept to their everyday life. Throughout the activity attention is also given to observing and predicting events involving energy. The students, in a few years, will be voting citizens. It is essential that they have the experience of making predictions based on present events, for as citizens, they will be asked to vote on numerous issues that affect their future. This is particularly vital in view of the increasing numbers of environmental issues on the ballots of many states.

BAC

Because energy is observe than define. can be defined as "any

Because energy is "material things" such all energy on the Earth formed as it flows from realize that while material energy is released from to recapture and save.

In heating the t wax is the fuel from w The wick merely serves oxygen in the air. Th the burning wax. The released as heat energy water. Some of the w occupies a space in ex increase in pressure f accumulates on the tes wax.

As a different ex react, producing large duction of this gas bu forces the cork to pop

The movement of t transformation of ligh in the bulb is black a

### UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

#### CORE A. INTRODUCTION TO ENERGY



BSCS

#### BACKGROUND INFORMATION FOR THE TEACHER

Because energy is a rather abstract concept, it is often easier to observe than define. For the purposes of this program, however, energy can be defined as "anything that causes something to move or change."

Because energy is a "nonmaterial thing," it is not recyclable; "material things" such as paper and cans are. The ultimate source of all energy on the Earth is the sun. Energy from this source is transformed as it flows from one organism to another. It is important to realize that while material things themselves are recyclable, when energy is released from them, the energy is difficult (often impossible) to recapture and save.

In heating the test tube in Activity 3-2 (Getting Corked Off), the wax is the fuel from which energy is being released in a burning candle. The wick merely serves as a medium for exposing the burning wax to the oxygen in the air. The energy used to pop the cork is coming mostly from the burning wax. The energy in the wax was stored as chemical energy and released as heat energy. It is transferred through the glass to the water. Some of the water is changed to its gaseous form, steam, which occupies a space in excess of 1700 times that of water. The resultant increase in pressure finally "pops the cork." The black residue which accumulates on the test tube is a waste product (carbon) from the burning wax.

As a different example, in Activity 3-2 vinegar and baking soda react, producing large amounts of carbon dioxide. The vigorous production of this gas builds up pressure within the test tube and finally forces the cork to pop.

The movement of the radiometer in Activity 3-2 results from the transformation of light energy to heat energy. One side of each flag in the bulb is black and the other is white. The white side reflects



## Me and my Environment

### UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

#### CORE A. INTRODUCTION TO ENERGY

##### CORE A RATIONALE (continued)

The interest of the students is stimulated by giving them the opportunity to experiment with scientific apparatus and materials in learning about energy. The activity is somewhat unstructured to begin with in the hope that the students' observations will raise questions that may be answered through further observation and thought.

Continued opportunity to observe and predict is provided. Initially the students make predictions based on their observations. These predictions, recorded on a worksheet, provide the teacher with an assessment of student understanding of the relationship between the amount of heat energy present and the amount of movement in a chemical subjected to that heat.

The students then become actively involved in constructing their own "energy wheels," pinwheels that they cause to turn by using the energy from a burning candle. The strategy encourages them to "discover" ways that they can make the pinwheel turn faster. This provides yet another example of the concept that the greater the input of energy, the greater the resulting change or movement.

When beginning to study energy, students are not always aware that energy can be released by chemicals. They first observe, and then design and perform experiments whereby chemicals cause movement and change. In thinking about what will happen when presented with a specific set of conditions, the students again practice making predictions.

There are numerous instances where information can more clearly and efficiently be presented in graph form. It should be apparent

##### BACKGROUND

most of the light (heat) rays. As a consequence, the black side, therefore, the radiation of heat acts on the flags. The inside of the flags, therefore, the flags are subjected to friction.

The diffusion of potassium permanganate in the petri dish (Energy) is again the result of the heat from the crystal and the water. This spread in the hot water because the water molecules move more rapidly. The flags are placed in water in order to observe the diffusion.

The pinwheel used in the experiment is heated by the candle flame. The heat causes the air to move upward, causing the pinwheel blades to turn. The more candles used, the faster it will turn because the greater the heat input.

The dramatic action of the candle flame (Energy) is sure to capture the attention of the students. It is essentially a combination of a combustion reaction and a color change. When placed in a tablet form. When placed in a tablet form.

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT  
CORE A. INTRODUCTION TO ENERGY



BSCS

BACKGROUND INFORMATION FOR THE TEACHER (continued)

most of the light (heat) rays. The black side absorbs most of the light (heat) rays. As a consequence of this unequal absorption of the light (heat) the black side of the flags becomes hotter than the white side. The hotter side, therefore, radiates off more heat energy. This unequal radiation of heat acts like a miniature rocket engine and turns the flags. The inside of the bulb of the radiometer is a partial vacuum; therefore, the flags are turned by the excited molecules with almost no friction.

The diffusion of molecules from the crystal of potassium permanganate in the petri dish in Activity 3-3 (Experimenting With Heat Energy) is again the result of heat energy. The molecules break away from the crystal and eventually become evenly distributed through the water. This spreading out of the molecules is greatly speeded up in the hot water because the energy causes the individual molecules to move more rapidly. The same principal applies when the tea bags are placed in water in the "Review Of Success" following Activity 3-3.

The pinwheel used in Activity 3-5 (The Energy Wheel) works because the candle heats the air molecules immediately above the flame causing them to move upward rapidly. The draft created pushes against the wheel blades, causing them to turn. It is a natural consequence that the more candles used, or the closer the candles are held to the wheel, the faster it will turn because of the greater upward draft that is caused by the greater amount of heat.

The dramatic action of the Alka-Seltzer in Activity 3-6 (Chemical Energy) is sure to capture the interest of your students. Alka-Seltzer is essentially a combination of citric acid and a carbonate in dry tablet form. When placed in water the two combine. This results in





## Me and my Environment

### UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

#### CORE A. INTRODUCTION TO ENERGY

##### CORE A RATIONALE (continued)

to anyone watching TV or reading newspapers and magazines that graphs increasingly are becoming a means of communication. The student is introduced to simple graph interpretation and construction. This newly learned skill is then put to immediate use in translating into graph form the data gathered in Activity 3-6.

Energy is a quantitative factor in the student's environment. The student learns that the amount of energy released from a system is proportional to the amount that entered. The concept is developed by observing and measuring the distance a bottle cap is propelled when a rubber band is stretched to varying lengths. By constructing a simple line graph of the measured distances, the student gains reinforcement of the idea that information can be communicated in a manner other than by the written or spoken word.

##### BACKGROU

the release of carbon acid and more highly much stronger reaction pressure within the st pushes down on the sur the tube and into the



UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE A. INTRODUCTION TO ENERGY



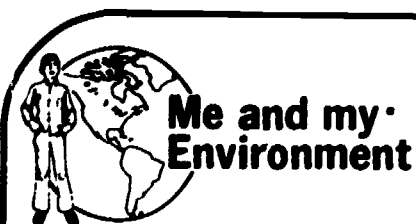
BSCS

BACKGROUND INFORMATION FOR THE TEACHER (continued)

the release of carbon dioxide. Vinegar, which is essentially acetic acid and more highly concentrated than citric acid, results in a much stronger reaction. The vigorous release of bubbles builds pressure within the stoppered tube. Here the increased pressure pushes down on the surface of the water, forcing it up and out of the tube and into the beaker.

magazines that graphs  
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UNIT III  
CORE A

PLANNING GUIDE

NOTE: Some activities (indicated in italics and an in the be prepared several days or weeks in advance. Use this a teaching and preparation schedule. All supplies need

Activity Number, Page, Tentative Teaching Date	Check List of Supplies Needed		(Italics and  in the)
	Materials You Furnish	Materials in Supply Kit	
3-1. Growing Plants  Page _____ Date planned _____	Bean seeds  Containers to plant seeds in  Commercial potting soil  Popsicle sticks, tongue depressors (or masking tape) Marking pencil		<i>Fifty - sixty. (planting.)</i> <i>dried beans for</i>  <i>Two per student. styrofoam cups</i> <i>Enough to fill at local garden</i>  <i>One per student. Class supply</i>
3-2. Getting Corked Off  Page _____ Date planned _____	An electrical appliance Jump rope Chair Candle Matches Paper towels Baking soda Vinegar Lamp or light source Large pieces of butcher paper Magazines or catalogs Paste or glue Scissors	Test tube Cork Test tube holder	<i>Suggest: fan, </i> <i>One</i> <i>One other than a</i> <i>One</i> <i>One book</i> <i>Class supply</i> <i>One box</i> <i>One bottle</i> <i>One</i>  <i>One per student</i> <i>One per student</i> <i>Class supply</i> <i>One pair per stu</i> <i>Two (18 X 150 mm</i> <i>Two (to fit 18 X</i> <i>One</i>

## PLANNING GUIDE



BSCS

Some activities (indicated in italics and an arrow in the margin) must be prepared several days or weeks in advance. Use this summary as a teaching and preparation schedule. All supplies needed are listed.

List of Supplies Needed		Notes and Suggestions to Teacher (Italics and Arrow Indicate Advance Preparation Directions)
sh	Materials in Supply Kit	
eds		<p><i>Fifty - sixty. (Soak in water overnight before the day of planting.) Purchase at garden shop, local nursery, or use dried beans from grocery store.</i></p> <p><i>Two per student. Collect ahead of time. Suggested containers: styrofoam cups, milk cartons, etc.</i></p> <p><i>Enough to fill the containers selected for planting. Purchase at local garden center.</i></p> <p><i>One per student. To be used to label the plantings.</i> Class supply</p>
g		<p><i>Suggest: fan, knife, drill, wall clock with second hand, etc.</i></p> <p>One One other than a student desk One One book Class supply One box One bottle One</p> <p>One per student One per student Class supply One pair per student. Include at least some left-handed scissors. Two (18 X 150 mm) Two (to fit 18 X 150 mm test tube) One</p>
	<p>Test tube Cork Test tube holder</p>	


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## Me and my Environment

UNIT III  
CORE A

## PLANNING GUIDE

NOTE: Some activities (indicated in *italics* and an  in the margin) be prepared several days or weeks in advance. Use this as a teaching and preparation schedule. All supplies needed

Activity Number, Page, Tentative Teaching Date	Check List of Supplies Needed		<i>(Italics and pencil icon in the margin)</i>
	Materials You Furnish	Materials in Supply Kit	
3-2. Getting Corked Off (Continued)		Measuring spoons Funnel Radiometer Chart Camera (Polaroid Square Shooter)	1/4 and 1/2 tea One One Forms Of Energy
3-3. Experimenting With Heat Energy  Page _____ Date planned _____	Ice Hot pad Spoons Overhead projector 35mm Slide projector Timer or wall clock with second hand	400 ml Beakers Hot plate Petri dishes Potassium permanganate crystals Worksheet 3-1 Worksheet 3-2 Transparency 3-1 Slide 3-1 Slide 3-2 250 ml Beakers Forceps	<i>Enough to make</i> One Two per pair of  Three One Two per pair of  Concentric circle Chart for diffusion Concentric circle Worksheet 3-1 Worksheet 3-2 Two One

## PLANNING GUIDE




**BSCS**

Some activities (*indicated in italics and an arrow in the margin*) must be prepared several days or weeks in advance. Use this summary as a teaching and preparation schedule. All supplies needed are listed.

List of Supplies Needed		Notes and Suggestions to Teacher ( <i>Italics and Arrow Indicate Advance Preparation Directions</i> )
ish	Materials in Supply Kit	
	Measuring spoons Funnel Radiometer Chart Camera (Polaroid Square Shooter)	1/4 and 1/2 teaspoon One One Forms Of Energy
with	400 ml Beakers Hot plate Petri dishes Potassium permanganate crystals Worksheet 3-1 Worksheet 3-2 Transparency 3-1 Slide 3-1 Slide 3-2 250 ml Beakers Forceps	<i>Enough to make a glass of ice water</i> One Two per pair of students  Three One Two per pair of students  Concentric circles Chart for diffusion lab Concentric circles and chart Worksheet 3-1 Worksheet 3-2 Two One

UNIT III  
CORE A

## PLANNING GUIDE

NOTE: Some activities (indicated in italics and an  in the margin) should be prepared several days or weeks in advance. Use this as a teaching and preparation schedule. All supplies needed are listed in the margin.



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# PLANNING GUIDE



BSCS

Some activities (indicated in italics and an arrow in the margin) must be prepared several days or weeks in advance. Use this summary as a teaching and preparation schedule. All supplies needed are listed.

List of Supplies Needed		Notes and Suggestions to Teacher (Italics and Arrow Indicate Advance Preparation Directions)
Activity	Materials in Supply Kit	
Worksheet 3-3	Worksheet 3-3	Two
1000 ml Beakers	1000 ml Beakers	Hot - Cold Tea
Slide 3-3	Slide 3-3	Two
Transparency 3-2	Transparency 3-2	Back of Worksheet 3-2
Petri dishes	Petri dishes	Front of Worksheet 3-3
Potassium permanganate crystals	Potassium permanganate crystals	Two
Forceps	Forceps	One
Glass bead	Glass bead	One roll
Rubber stopper with holes	Rubber stopper with holes	Two per student
Slide 3-4	Slide 3-4	One per student
Slide 3-5	Slide 3-5	One per student
Slide 3-6	Slide 3-6	One pair per student
Slide 3-7	Slide 3-7	Several books
Worksheet 3-4	Worksheet 3-4	One piece 4" X 6" per student
		Several
		One per student
		One per student (Size 8)
		Clue To Success Question 1
		Clue To Success Question 2
		Clue To Success Question 3
		Clue To Success Question 4
		Clue To Success

40



## Me and my Environment

UNIT III  
CORE A

## PLANNING GUIDE

NOTE: Some activities *(indicated in italics and an arrow in the margin)* be prepared several days or weeks in advance. Use this a teaching and preparation schedule. All supplies need

Activity Number, Page, Tentative Teaching Date	Check List of Supplies Needed		<i>(Italics and arrow in the margin)</i>
	Materials You Furnish	Materials in Supply Kit	
3-6. Chemical Energy  Page _____ Date planned _____	35mm Slide projector Pin wheels Detergent Alka-Seltzer tablets Vinegar Cooking oil Tap water	Test tube Rubber stopper Plastic tubing 400 ml Beaker Worksheet 3-5 Slide 3-8 Slide 3-9 Worksheet 3-6	<i>Constructed in the school            For washing to            Forty-three to            One bottle (quart)            One bottle (quart)</i>  One per pair of One per pair of 18" piece per One per pair of Alka-Seltzer Worksheet 3-5 Worksheet 3-6 Alka-Seltzer
3-7. How Tall Is J. Oscar Hooperstraat  Page _____ Date planned _____	35mm Slide projector	Worksheet 3-7 Slide 3-10 Slide 3-11 Slide 3-12 Slide 3-13 Slide 3-14 Slide 3-15 Slide 3-16	Clue To Success Growth of J. O. School Absence Rats of New York Clue To Success Clue To Success Clue To Success Clue To Success



## PLANNING GUIDE



**BSCS**

Some activities (indicated in italics and an arrow in the margin) must be prepared several days or weeks in advance. Use this summary as a teaching and preparation schedule. All supplies needed are listed.


List of Supplies Needed		Notes and Suggestions to Teacher (Italics and Arrow Indicate Advance Preparation Directions)
Activity	Materials in Supply Kit	
	Test tube Rubber stopper Plastic tubing 400 ml Beaker Worksheet 3-5 Slide 3-8 Slide 3-9 Worksheet 3-6	<i>Constructed in previous activity</i> <i>For washing test tubes</i> <i>Forty-three tablets needed for a class of sixteen</i> <i>One bottle (quart)</i> <i>One bottle (quart)</i>  One per pair of students (25 X 300 mm) One per pair of students (Number 4-one hole) 18" piece per pair of students One per pair of students Alka-Seltzer (Liquid Variable) Worksheet 3-5 Worksheet 3-6 Alka-Seltzer (Temperature Variable)
	Worksheet 3-7 Slide 3-10 Slide 3-11 Slide 3-12 Slide 3-13 Slide 3-14 Slide 3-15 Slide 3-16	Clue To Success Growth of J. Oscar Hooperstraat School Absences Rats of New York City Clue To Success Question 1 Clue To Success Question 2 Clue To Success Question 3 Clue To Success Question 4




## Me and my Environment

UNIT III  
CORE A

## PLANNING GUIDE


NOTE: Some activities (indicated in *italics* and an  in the be prepared several days or weeks in advance. Use this a teaching and preparation schedule. All supplies need

Activity Number, Page, Tentative Teaching Date	Check List of Supplies Needed		(Italics and  in the)
	Materials You Furnish	Materials in Supply Kit	
3-8. The High Flyer  Page _____ Date planned _____	35mm Slide projector 12" Ruler Nails (1" to 1 1/2" long) Rubber bands Plywood Flyer caps  Hammer	Worksheet 3-8 Slide 3-17 Worksheet 3-9 Slide 3-18	<i>One per team of</i> <i>Two per team of</i> <i>One per team of</i> <i>One piece (12" x</i> <i>One jar cover ne</i> <i>about 2" in di</i> <i>One</i> <i>Chart For High F</i> <i>Worksheet 3-8</i> <i>Graph For High F</i> <i>Worksheet 3-9</i>

# PLANNING GUIDE



BSCS

The activities (indicated in italics and an  in the margin) must be prepared several days or weeks in advance. Use this summary as a teaching and preparation schedule. All supplies needed are listed.

List of Supplies Needed	Notes and Suggestions to Teacher (Italics and Arrow Indicate Advance Preparation Directions)
Materials in Supply Kit	
<p>Worksheet 3-8 Slide 3-17 Worksheet 3-9 Slide 3-18</p>	<p>One per team of three students Two per team of three students One per team of three students (3 1/2" to 4" unstretched length) One piece (12" X 12") per team of three students One jar cover needed per team of three students. Cover should be about 2" in diameter. Suggest tops off of paste jars, etc. One Chart For High Flyer Worksheet 3-8 Graph For High Flyer Worksheet 3-9</p>



## Me and my Environment

### OBJECTIVE FOCUS FOR THIS ACTIVITY

#### UNIT GOALS:

1. Realize and appreciate the energy inter-relationships between organisms.
2. Appreciate and understand man's dependence on green plants for food.

### MATERIALS

- \*Bean seeds (soaked overnight)
- \*Containers (styrofoam cups, cut off milk cartons, etc.) two per student
- \*Commercial potting soil
- \*Popsicle sticks (enough for one per student) or masking tape
- \*Marking pencil

\*Not furnished in materials kit

### TEACHING STRATEGIES

#### Activity 3-1. Growing Plants

Later in this unit a number of plants will be required for experimentation. Commercial plants could be used but in keeping with the philosophy of fostering student participation, the students will grow the plants themselves. This activity has no direct relationship to the unit objectives, but is merely a preparatory activity. It is hoped that through this plant-growing experience, the student's ideas about plant needs will be reinforced and he will conclude that air, water, and sunlight are necessary for growth.

#### Teacher Preparation:

1. Bean seeds are suggested because of their rapid germination and growth. Other seeds may be planted and perhaps will grow in time, but if other seeds are used, they should be used along with the bean seeds.
2. Soak bean seeds overnight to speed germination.
3. Set up as many containers as there are students in class and plant two beans yourself in each of these containers. These will serve as extra plants, which you should care for to insure that there will be enough plants for the activities in

### FOCUS FOR THIS ACTIVITY

#### GOALS:

1. Realize and appreciate the energy inter-relationships between organisms.
2. Appreciate and understand man's dependence on green plants for food.

### UNIT III.

### ENERGY RELATIONSHIPS IN MY ENVIRONMENT

### CORE A.

### INTRODUCTION TO ENERGY

### ACTIVITY 3-1. GROWING PLANTS



**BSCS**

### TEACHING STRATEGIES

#### 3-1. Growing Plants

In this unit a number of plants will be required for demonstration. Commercial plants could be used in keeping with the philosophy of fostering student learning, the students will grow the plants themselves. This activity has no direct relationship to objectives, but is merely a preparatory activity. It is hoped that through this plant-growing activity, the student's ideas about plant needs will be clarified and he will conclude that air, water, and light are necessary for growth.

#### Preparation:

Bean seeds are suggested because of their rapid germination and growth. Other seeds may be planted. Perhaps other seeds will grow in time, but if other seeds are used, they should be used along with the bean seeds.

Soak bean seeds overnight to speed germination.

Prepare as many containers as there are students in the class and plant two beans yourself in each of the containers. These will serve as extra plants, which you should care for to insure that there will be enough plants for the activities in

### ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

- have planted some bean seeds.
- have participated in a discussion about the care of plants.

ACTIVITY 3-1

6

MATERIALS

TEACHING STRATEGIES

Core D. Also, if the students' plants do not all grow, or if they want to keep them, there will still be enough for the activities.

4. Coleus or variegated geranium plants will be needed later in the unit. Since these are sometimes difficult to locate, start looking now for a place where they can be purchased so you will be sure to have them available when needed.

Explain to the students what they are to do by saying:

LATER IN THIS UNIT WE WILL NEED SOME PLANTS FOR OUR EXPERIMENTS. THEREFORE, WE ARE GOING TO PLANT SOME SEEDS. BEFORE WE PLANT OUR SEEDS, WHAT THINGS MUST WE REMEMBER TO DO WHEN GROWING AND TAKING CARE OF PLANTS?

As students suggest the needs of the plant, write them on the chalkboard.

Say:

ALL YOUR SUGGESTIONS ARE GOOD ONES, BUT THE ONES WE MUST BE ESPECIALLY CAREFUL TO REMEMBER ARE SUNLIGHT AND WATER. (Circle or underline these on the chalkboard.) WHAT WILL HAPPEN IF OUR PLANTS DO NOT GET SUNLIGHT AND WATER?

Instruct the students to plant their seeds by filling their containers almost to the top with potting soil. Distribute two bean seeds each to the students and tell them to push each seed under the soil, pressing it down about as far as the length of a fingernail, and then covering it. Tell them to write their names with pencils on popsicle sticks and insert the sticks into the soil.

## TEACHING STRATEGIES

Also, if the students' plants do not all  
or if they want to keep them, there will still  
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## ANTICIPATED STUDENT BEHAVIORS

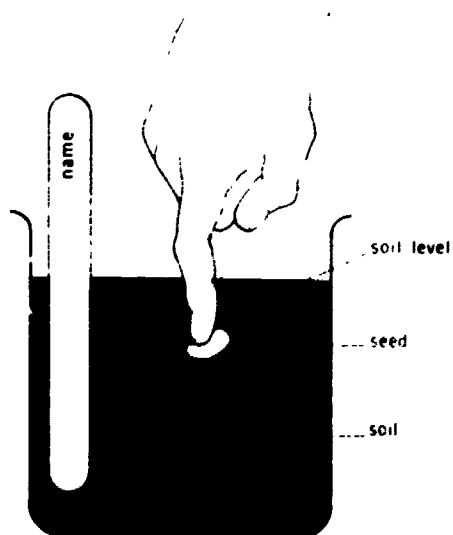
Students:

--suggest, "Water the plants," "Put the plants in  
the sun," "They need air," "Put them near an  
open window," "Give them attention," "Fertilize  
them."

--guess, "They'll die," "Wilt," "Shrivel up."

## MATERIALS

Diagram 3-1



## TEACHING STRATEGIES

at the edge of the containers, as shown in Diagram 3-1. If popsicle sticks cannot be obtained, have the students write their names on pieces of masking tape and stick the pieces of tape to their containers. If the beans have not sprouted within a week, allow students to plant two more seeds. Caution each of the students that since he is in charge of the plant, and since it belongs to him, he must be responsible for watering it properly.

The soil should be kept moist but not soaked. You might show them the difference with two of the extra containers.



### TEACHING STRATEGIES

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### ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-1

7

UNIT III, CORE A  
ACTIVITY 3-1: "Growing Plants"

Activity name suggested by class:

Teacher	
BSCS USE:	Post Tally Rev
Day 1	Day 2
Day 3	Day 4
Day 5	Day 6

1.	Date taught (month and date, e.g. 11/2)					
2.	Minutes of class time on science each day					
3.	Minutes of preparation each day					
4.	Students absent on each date (Use ID Number)					

5. Interest of class as expressed by apparent attention to what is happening.Number of students responding with: Name students you noted especially:  
(Number)

HIGH INTEREST	_____
MODERATE INTEREST	_____
INDIFFERENCE	_____
MODERATE RESISTANCE	_____
STRONG DISLIKE	_____
HARD TO RATE	_____

6. Equipment in kit: ☐ None ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use.
7. Equipment I got: ☐ None ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:	Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:
10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:
11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:
12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?
13. Did activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:
14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:
15. Your rating of this activity:  
☐ worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless  
--keep as is revision suggested major changes described --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

Equipment I got: ☐ None ☐ Easy ☐ Hard to get, ☐ Hard to get, ☐ Unobtainable, ☐ Difficult  
needed to get but okay add to kit add to kit

8. Materials used:

Worksheet #	#	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:

☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless  
--keep as is revision suggested major changes described --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed.  
What parts of this activity should be retained when the curriculum is revised?  
Page(s) \_\_\_\_\_:

17. Was finding a place to keep and care for the duplicate set of bean plants a problem?  
☐ No ☐ Yes: Comment.

18. Have any students had difficulty caring for their plants?

How many? ☐ 1/4 ☐ 1/2 ☐ 3/4 ☐ All: Comment.

19. Concern (or questions) about content:

20. Messages for staff (read immediately):

BSCS Evaluation, EMH Feedback Form 1c

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

SIDE A

UNIT III, CORE A  
ACTIVITY "Growing Plants"

Teacher \_\_\_\_\_

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- |  |  |
|--|--|
| <input type="checkbox"/> how you organized materials or class.   | <input type="checkbox"/> who had problems and what they were.            |
| <input type="checkbox"/> things added (a question, a picture, etc.).   | <input type="checkbox"/> how someone "caught on" (or who never did).     |
| <input type="checkbox"/> equipment, supplies, visual aids.   | <input type="checkbox"/> who was really "turned off" (or on).            |
| <input type="checkbox"/> things that went wrong, misunderstandings.  | <input type="checkbox"/> reactions of parents, teachers, students.       |
| <input type="checkbox"/> what you would do differently or avoid next time.   | <input type="checkbox"/> special evidence of learning or applying ideas. |
| <input type="checkbox"/> turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them. |  |

THE STUDENTS



## Me and my Environment

### OBJECTIVE FOCUS FOR THIS ACTIVITY

#### UNIT GOALS:

1. Realize and appreciate the energy inter-relationships between organisms.

#### CORE A OBJECTIVES:

1. Define energy as "anything that causes something to move or change."
2. Recognize that the ability to move or cause movement requires energy.
5. Recognize different forms of energy (heat, light, chemical, and electrical).

### MATERIALS

### TEACHING STRATEGIES

#### Activity 3-2. Getting Corked Off

*Through discussion and observation the student will expand his concept of energy, building background information for later activities. Demonstrations and participation experiences will provide opportunities to identify forms of energy and their sources.*

**FOCUS FOR THIS ACTIVITY**

**GOALS:**

1. Realize and appreciate the energy inter-relationships between organisms.

**A OBJECTIVES:**

1. Define energy as "anything that causes something to move or change."
2. Recognize that the ability to move or cause movement requires energy.
5. Recognize different forms of energy (heat, light, chemical, and electrical).

**TEACHING STRATEGIES**

**-2. Getting Corked Off**

discussion and observation the student will concept of energy, building background information for later activities. Demonstrations and participation experiences will provide opportunities to learn about forms of energy and their sources.

**UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT**

**CORE A. INTRODUCTION TO ENERGY**

**ACTIVITY 3-2. GETTING CORKED OFF**



**ANTICIPATED STUDENT BEHAVIORS**

At the end of this activity, each student should:

- be able to define energy as "anything that causes something to move or change."
- have observed and participated in demonstrations showing four different kinds of energy in action.
- list and identify the four kinds of energy as heat, light, electrical energy, and chemical energy.
- have taken a picture showing one kind of energy in his school environment.
- have discussed his picture of energy with other students in the class.

# ACTIVITY 3-2

10

## MATERIALS

- 1 Test tube, Pyrex, (18 X 150 mm)
- 1 Cork to fit test tube
- 1 Test tube holder
- \*An electrical appliance (mixer, fan, knife, drill, wall clock if second hand moves)
- \*Jump rope
- \*Chair
- \*Candle
- \*Matches
- \*Test tube rack

(Continued later in activity)

\*Not furnished in materials kit

## TEACHING STRATEGIES

### Teacher Preparation:

1. *Try both cork-popping demonstrations several times prior to the class to gain confidence, to determine roughly how long it takes, and to determine how tightly it is necessary to stopper the tube. In the demonstration where water is boiled, a cork too tightly fitted may allow pressure to build up high enough to shatter the tube.*
2. In the baking soda-vinegar demonstration, it is very important that the cork be placed in the test tube immediately after adding the vinegar. Precautions should be taken to cover the work area because some liquid may spurt out on the table.

For the beginning demonstration you will fill a test tube with water, cork it, and hold it over the flame of a candle with the test tube holder. To focus the students' attention on the test tube describe what you are doing.

Hold up the test tube and ask:

WHAT IS THIS?

NOW WATCH CAREFULLY WHAT I'M DOING. I'M GOING TO ASK YOU TO DESCRIBE WHAT I'VE DONE.

Fill the test tube 1/5 full of water and set the cork in the tube, tapping it with your finger. While doing this ask:

WHAT HAVE I DONE THUS FAR?

## TEACHING STRATEGIES

Introduction:

th cork-popping demonstrations several times to the class to gain confidence, to determine how long it takes, and to determine how it is necessary to stopper the tube. In demonstration where water is boiled, a cork tightly fitted may allow pressure to build up enough to shatter the tube.

baking soda-vinegar demonstration, it is important that the cork be placed in the test tube immediately after adding the vinegar. Precaution should be taken to cover the work area so some liquid may spurt out on the table.

During demonstration you will fill a test tube with water, cork it, and hold it over the flame of a Bunsen burner. To focus the students' attention on the test tube describe what you are doing.

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THIS?

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Fill the test tube 1/5 full of water and set the cork in the test tube holder. While doing this

WHAT HAVE I DONE THUS FAR?

## ANTICIPATED STUDENT BEHAVIORS

Students:

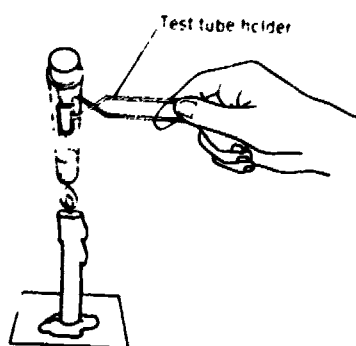
--respond, "A test tube," "A tube," "A glass tube."

--after careful observation, state what you did --  
put water in the test tube so that it was about  
1/5 full and placed a cork in the end.



## MATERIALS

Diagram 3-2



## TEACHING STRATEGIES

Ask a student to light the candle, let several drops of hot wax drip on a piece of paper, and set the candle in it, as shown in Diagram 3-2.

### CAUTIONS:

1. Do the remainder of this experiment as a demonstration only. It could be somewhat dangerous in the hands of the students.
2. Do not stopper the test tube too tightly.
3. Use only a cork stopper, NOT RUBBER, which fits too snugly.
4. Make sure the test tube is Pyrex.
5. Point the test tube away from both you and the students during the heating process.
6. Do not attempt to remove the stopper with your fingers while the water is still hot, or the water will spurt out.

Say:

AGAIN WATCH AND DESCRIBE WHAT I'M DOING.

Be sure the tube is at an angle pointing away from you and the students. Move the tube in and out of the flame of the lighted candle in order not to get too violent a reaction.

Continue doing this until the cork pops out.

NOTE: The cork pops because of the expanding gases in the test tube. Heat causes the gas molecules to move more rapidly.

## TEACHING STRATEGIES

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rip on a piece of paper, and set the candle in  
own in Diagram 3-2.

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cork pops because of the expanding gases in  
test tube. Heat causes the gas molecules to  
e more rapidly.

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-2

11

Students:

--light the candle.

--observe and describe the demonstration.

ACTIVITY 3-2

12

MATERIALS

TEACHING STRATEGIES

OBSERVATION T

While students are observing, encourage them to describe as many things as possible that they see happening.

After the demonstration is completed, ask:

WHAT HAPPENED?

NOTE: If students observe that the test tube turned black, you might help them decide that the black color is on the test tube and that it is coming from the candle and coating the outside of the test tube. It is not the water that is turning black. Pass the test tube around so they can make this determination.

WOULD THE SAME THING HAPPEN IF WE DIDN'T HEAT THE TEST TUBE?

Regardless of what the answer is ask the students:

HOW COULD WE FIND OUT?

WHAT CAUSED THE CORK TO POP?

(Student's name), DO YOU AGREE WITH THAT?  
WHAT DO YOU THINK?

(Student's name), DO YOU AGREE WITH THAT?  
WHAT DO YOU THINK

## TEACHING STRATEGIES

### OBSERVATION TIME

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YOU THINK?

t's name), DO YOU AGREE WITH THAT?  
YOU THINK

## ANTICIPATED STUDENT BEHAVIORS

Students:

--notice that you are moving the test tube back and  
forth over the flame, that the water is boiling,  
steam is forming, tube is getting black, etc.

--respond, "The cork popped out," "The test tube  
got black," "The water boiled," "The pressure  
made it pop," "Steam came out."

--speculate that it wouldn't.

--suggest repeating the experiment by passing the  
test tube over the unlighted candle.

--respond, "Flame," "Heat," "Candle," "Pressure,"  
"Pressure from the steam," "Hot water."

--express agreement or disagreement, giving reasons.

--express agreement or disagreement, giving reasons.

## MATERIALS

## TEACHING STRATEGIES

NOTE: Encourage many students to participate in the speculation, judging, and observing by asking one student if he agrees with another, by asking one student if he has a different idea or comment.

If the students do mention the word energy say:

ALL OF YOUR IDEAS ARE GOOD, BUT ONE OF YOU SUGGESTED THE WORD THAT SCIENTISTS USE MOST OFTEN -- "ENERGY." ENERGY MADE THE CORK POP.

Write the word "energy" on the chalkboard.

If students do not mention the word energy, say:

THESE ARE ALL GOOD IDEAS. WE HAVE ANOTHER WORD THAT CAN BE USED INSTEAD OF HEAT (PRESSURE, STEAM, CANDLE OR ANY OTHER WORD SUGGESTED). THAT WORD IS "ENERGY."

Continue by saying:

ANYTHING THAT CAN CAUSE SOMETHING TO MOVE OR TO CHANGE WE CALL ENERGY.

HAVE YOU EVER HAD THE FEELING THAT YOU JUST DON'T HAVE ANY ENERGY?

WHAT'S IT LIKE TO HAVE THAT FEELING?

Ask for volunteers or select two students to come to the front of the room. Ask one student to jump rope and ask the other to stand perfectly still.

Then ask:

## TEACHING STRATEGIES

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Volunteers or select two students to come to the  
the room. Ask one student to jump rope and ask  
to stand perfectly still.

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-2

13

Students:

--respond, "Yes."

--respond, "I don't feel like doing anything,"  
"I don't want to get up," "Lazy," "Tired."

ACTIVITY 3-2

14

MATERIALS

TEACHING STRATEGIES

WHO LOOKS LIKE HE IS USING THE MOST ENERGY,  
(student's name) OR (student's name)?

WHY?

IS EITHER PERSON USING ANY ENERGY?

WHAT IS HE DOING?

DOES THAT TAKE ENERGY?

Direct the two students to return to their seats. Have another student pick up and carry a chair from one end of the room to the other.



Ask:

WHAT DID (student's name) DO?

WHAT DID HE USE TO DO THIS?

If the students say that arms or muscles are doing the work, ask:

WHAT ARE (student's name) ARMS (MUSCLES) USING  
TO CARRY THE CHAIR?

THINK OF YOUR MOTHER SCRUBBING THE FLOOR OR  
YOUR FATHER MOWING THE LAWN. WHAT ARE THEY  
BOTH USING TO DO THIS WORK?

## TEACHING STRATEGIES

DOES HE LOOK LIKE HE IS USING THE MOST ENERGY,  
(student's name) OR (student's name)?

WHICH PERSON IS USING ANY ENERGY?

WHAT IS HE DOING?

WHAT IS HE TAKING ENERGY?

Two students to return to their seats. Have  
them pick up and carry a chair from one end  
to the other.



DOES (student's name) DO?

DOES HE USE TO DO THIS?

Students say that arms or muscles are doing the

DOES (student's name) USE ARMS (MUSCLES) USING  
TO MOVE THE CHAIR?

IS YOUR MOTHER SCRUBBLING THE FLOOR OR  
OTHER MOWING THE LAWN. WHAT ARE THEY  
DOING TO DO THIS WORK?

## ANTICIPATED STUDENT BEHAVIORS

Students:

--identify student jumping rope.

--respond, "Because he's doing something," "He's  
jumping up and down," "He's jumping rope."

--respond, "Yes," "No," "I don't know."

--reply, "Moving," "Jumping."

--infer that because energy was defined as anything  
that can cause something to move or to change,  
the student is using energy.

--respond, "Carry the chair."

--respond, "Arms," "Energy."

--infer that energy is used.

--respond, "Energy."



## MATERIALS

## TEACHING STRATEGIES

WE'VE SEEN THE CORK FLY OUT OF THE TEST TUBE.  
WE'VE SEEN (student's name) JUMP ROPE. WE'VE  
SEEN (student's name) CARRY THE CHAIR. TO DO  
THESE THINGS WE NEED ENERGY. WHAT IS ENERGY?

On the board, after the word "energy," write "is anything  
that causes something to move or change."

IS THE ENERGY OR "GO POWER" NEEDED TO DO  
DIFFERENT THINGS ALL THE SAME?

WHAT ARE SOME THINGS OTHER THAN PEOPLE THAT  
USE ENERGY?

WHAT KINDS OF ENERGY DO THEY USE?

ARE ALL THESE ENERGIES ALIKE?

Ask a student to come to the front of the room and operate  
any electrical appliance that demonstrates movement.  
(Fan, carving knife, electrical toothbrush, 1/4" drill,  
mixer, wall clock with moving second hand.)

WHAT IS HAPPENING?

WHAT IS MAKING THE (appliance) MOVE?

WHAT KIND OF ENERGY IS MAKING THE (appliance)  
WORK?

Using the same candle and test tube setup as at the begin-  
ning of the activity (without a cork), have another stu-  
dent bring water to a boil in the test tube.

## TEACHING STRATEGIES

SEEN THE CORK FLY OUT OF THE TEST TUBE.  
SEEN (student's name) JUMP ROPE. WE'VE  
(student's name) CARRY THE CHAIR. TO DO  
THINGS WE NEED ENERGY. WHAT IS ENERGY?

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s something to move or change."

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ing knife, electrical toothbrush, 1/4" drill,  
l clock with moving second hand.)

IS HAPPENING?

IS MAKING THE (appliance) MOVE?

KIND OF ENERGY IS MAKING THE (appliance)

same candle and test tube setup as at the begin-  
activity (without a cork), have another stu-  
water to a boil in the test tube.

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-2

15

Students:

--respond, "It's something that causes something  
else to move."

--guess, "I don't know," "Yes," "No."

--suggest such things as cars and other machines  
such as TV sets, furnaces, stoves, motorcycles,  
bombs, dynamite, etc.

--respond, "Electricity," "Motors," "Fire," "Heat,"  
"Muscles," "Light," "Food."

--guess that they may not be alike.

--respond, "The fan's turning," "The drill is  
turning," "It's moving," etc.

--respond, "Energy."

--respond, "Electrical," "Electricity."

ACTIVITY 3-2

16

MATERIALS

\*Paper towels to cover work surface  
 \*Baking soda  
 \*Vinegar  
 Measuring spoons (1/4 and 1/2 teaspoon)  
 Funnel  
 Test tube, Pyrex (18 X 150 mm)  
 Cork to fit test tube  
 Test tube holder  
 \*Test tube rack

\*Not furnished in materials kit

TEACHING STRATEGIES

WHAT IS BEING DONE HERE?

IS SOMETHING MOVING OR CHANGING?

IS ENERGY BEING USED THEN?

WHAT KIND OF ENERGY IS MAKING THE WATER BOIL?

Now let's look at another demonstration. Display the materials to be used:

HOW IS THIS ONE DIFFERENT FROM THE LAST ONE?

WHAT'S THE DIFFERENCE BETWEEN THESE MATERIALS AND THE ONES WE USED IN THE LAST DEMONSTRATION?

WATCH WHAT I DO.

Perform the following demonstration.

1. Place a medium sized test tube in the test tube rack.
2. Using a funnel, add 1/4 teaspoon baking soda.
3. Add 1/2 teaspoon vinegar and very quickly stopper the tube with the cork. (Since the reaction happens so quickly, it is suggested that the cork be held with one hand next to the opening of the tube while the vinegar is added with the other.) In order to prevent confusion in the students' minds between chemicals and food, it might be best to have the baking soda and vinegar in containers other than the commercial ones.

Ask:

## TEACHING STRATEGIES

BEING DONE HERE?

THING MOVING OR CHANGING?

BY BEING USED THEN?

ND OF ENERGY IS MAKING THE WATER BOIL?

ok at another demonstration. Display the  
be used:

THIS ONE DIFFERENT FROM THE LAST ONE?

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ONES WE USED IN THE LAST DEMONSTRATION?

HAT I DO.

Following demonstration.

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2 teaspoon vinegar and very quickly stopper  
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hile the vinegar is added with the other.)  
er to prevent confusion in the students'  
etween chemicals and food, it might be  
have the baking soda and vinegar in  
ers other than the commercial ones.

## ANTICIPATED STUDENT BEHAVIORS

Students:

--respond, "The water's boiling," "It's bubbling,"  
"Water's getting hot."

--respond, "Yes," "The stuff inside," "The water."

--infer that since something is moving and changing,  
energy is being used.

--respond, "Heat," "Fire."

--reply, "The stuff is different," "We're not using  
a machine," "We're using different things."

--suggest that they aren't plugged in, they don't  
have movable parts, they're not electrical.

## MATERIALS

Radiometer  
\*Lamp or light source

\*Not furnished in materials kit

## TEACHING STRATEGIES

WHAT HAPPENED?

DID SOMETHING MOVE OR CHANGE?

WAS ENERGY USED?

WHAT KIND OF ENERGY MADE THE CORK POP?

If "chemical energy" is not suggested, say:

THE POWDERED CHEMICAL IS BAKING SODA AND THE LIQUID CHEMICAL IS VINEGAR. THE CORK POPPED BECAUSE THESE TWO CHEMICALS REACTED WITH EACH OTHER. CALL THIS KIND OF ENERGY CHEMICAL ENERGY.

If student interest is high, this demonstration may be repeated by individual students, for there is no danger involved. Precautions, such as covering the working areas, should be taken to catch the fluid which will spill out of the tubes.

Say:

LET'S LOOK AT STILL ANOTHER DEMONSTRATION.

Set the radiometer included in the kit in direct sunlight. Make sure it is easily visible to all students. If direct sunlight is not available, turn on a lamp close to the radiometer.

Ask:

WHAT IS HAPPENING TO THIS RADIOMETER?

## TEACHING STRATEGIES

HAPPENED?

SOMETHING MOVE OR CHANGE?

ENERGY USED?

KIND OF ENERGY MADE THE CORK POP?

If "chemical energy" is not suggested, say:

THE POWDERED CHEMICAL IS BAKING SODA AND THE LIQUID CHEMICAL IS VINEGAR. THE CORK POPPED BECAUSE THESE TWO CHEMICALS REACTED WITH EACH OTHER. CALL THIS KIND OF ENERGY CHEMICAL ENERGY.

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LOOK AT STILL ANOTHER DEMONSTRATION.

radiometer included in the kit in direct sunlight. it is easily visible to all students. If direct is not available, turn on a lamp close to the

IS HAPPENING TO THIS RADIOMETER?

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-2

17

Students:

--respond, "Cork blew off," "Cork popped,"  
"The stuff bubbled."

--respond, "Yes."

--infer that because something moved or changed,  
energy was being used.

--respond, "The stuff you put in the test tube,"  
"Chemical energy."

--respond, "It's turning," "It's moving," "It's  
spinning."

ACTIVITY 3-2

18

MATERIALS

TEACHING STRATEGIES

IS SOMETHING MOVING OR CHANGING?

IS ENERGY BEING USED?

WHAT KIND OF ENERGY IS MAKING IT SPIN?

HOW COULD WE SHOW THAT IT IS REALLY LIGHT ENERGY  
THAT IS MAKING IT MOVE?

Stand or put something between the radiometer and the light  
source to show that without light the radiometer slows down  
and finally stops.

To conclude this activity, ask:

SO FAR WE HAVE SEEN FOUR DIFFERENT KINDS OF  
ENERGY DO WORK. WHAT ARE THE FOUR KINDS?

Write the kinds of energy on the board.

WHAT DOES ENERGY DO?

It is recognized that other forms of energy exist, but  
these four are sufficient for understanding the concept  
of energy at this point.

CLUES TO SU

*This instructional assessment is designed to find out if  
the student has formed an idea of what energy is and to  
see if he understands that there are many forms of energy.*

## TEACHING STRATEGIES

THING MOVING OR CHANGING?

BY BEING USED?

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S ENERGY DO?

ized that other forms of energy exist, but  
e sufficient for understanding the concept  
this point.

## ANTICIPATED STUDENT BEHAVIORS

Students:

--respond, "Yes."

--infer that since something is moving or changing,  
energy is being used.

--respond, "Sunlight," "Light energy."

--suggest putting it in the dark.

--recall and state, "Electrical," "Heat," "Chemical,"  
and "Light."

--respond, "Makes something move," "Makes something  
change," "Does something," "Makes something work."

CLUES **TO** SUCCESS



ional assessment is designed to find out if  
as formed an idea of what energy is and to  
erstands that there are many forms of energy.



## MATERIALS

- \*Large pieces of butcher paper, 3' X 3' newsprint, or other large types of paper (at least one for every student)
- \*Magazines, catalogs (at least one per student)
- \*Paste or glue (one bottle per student)
- \*Scissors (one pair for every student)
- Chart 3-1 (of forms of energy)

(Continued on next page)

\*Not furnished in materials kit

## TEACHING STRATEGIES

*He will be asked to identify forms of energy he uses or sees in his world. He will do this by cutting out pictures from magazines or catalogs, photographing things he sees everyday that involve energy, then labeling the form of energy each of these things involves.*

Just prior to the activity on making an energy chart, organize your students in pairs for the purpose of taking pictures. (The pupils are paired only for the picture taking exercises.) The photographing will be done simultaneously with the individual construction of energy charts.

Instruct each pair of students to take two pictures in their immediate school environment, inside and/or outside. Each picture should show an example of a different type of energy. (Direct students to take four pictures, one for each form of energy, if film supply permits.) Be sure to secure permission slips for students, if needed.

Have students label pictures properly, making sure to list the form of energy that each picture represents. At the conclusion of the chartmaking exercise, display the photos on the bulletin board for a show-and-tell discussion.

Ask:

IN THE LAST PART OF THIS ACTIVITY WE TRIED TO SEE IF WE COULD THINK OF DIFFERENT THINGS THAT USE ENERGY. WHAT ARE SOME OF THESE THINGS?

Encourage each student to recall at least one item. List the items on the chalkboard. Display the wall chart of forms of energy and say:

## TEACHING STRATEGIES

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s world. He will do this by cutting out pictures  
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F WE COULD THINK OF DIFFERENT THINGS THAT  
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n the chalkboard. Display the wall chart of  
ergy and say:

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-2

19

Students:

--engage in taking pictures to represent various  
forms of energy.

--recall the items used to demonstrate energy  
(candle, match, steam, electrical appliance,  
vinegar, baking soda, sunlight or lamp,  
radiometer).

ACTIVITY 3-2

20

MATERIALS

Camera (Polaroid Square Shooter)  
Film  
Flash cubes

TEACHING STRATEGIES

HERE IS A CHART THAT SUMS UP ALMOST EVERYTHING  
WE TALKED ABOUT IN THIS ACTIVITY. IT MIGHT HELP  
US TO REMEMBER SOME OF THE THINGS WE DID.

Ask one or more of the students to describe the chart.

Tell students that today each student is going to make his own chart of energy forms. Have available in the classroom many magazines and/or catalogs and instruct the students to cut out as many examples of things that use energy as they can find. They can either paste these pictures on a large piece of paper to make a large chart or use several pieces of smaller sized paper to paste the pictures on and later assemble them into a scrapbook. Tell students that underneath or near each picture of energy in use they are to label what form of energy it is (heat, chemical, light, electrical). Have these words written in plain view on the wall chart or chalkboard for the students to see. Tell students they should try to find at least three examples of each kind of energy.

An understanding of energy forms is indicated by posters that have at least three acceptable examples of each type of energy. Some things use more than one kind of energy to operate (stove uses both heat and electrical) so in certain cases more than one answer may be acceptable.



## TEACHING STRATEGIES

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least three acceptable examples of each type  
Some things use more than one kind of energy  
(stove uses both heat and electrical) so in  
more than one answer may be acceptable.

## ANTICIPATED STUDENT BEHAVIORS

Students:

--describe the word energy in the center and the four  
kinds of energy, one in each corner, connected  
to the word energy by arrows. Also describe the  
pictures included under each kind of energy.

--construct energy chart or scrapbook.

## MATERIALS

## TEACHING STRATEGIES

Say:

NOW THAT YOU HAVE COMPLETED YOUR ENERGY CHARTS,  
LET US SEE WHAT KIND OF ENERGY IS BEING USED IN  
OUR SCHOOL ENVIRONMENT.

Have students gather around bulletin board. Let each student explain his picture and indicate the type of energy evident. After each picture has been discussed by the taker, allow other class members to re-examine pictures in search of additional forms of energy within the same photo.

When all discussion is over, ask:

HAVE WE TAKEN PICTURES THAT REPRESENT THE FOUR  
FORMS OF ENERGY THAT WE STUDIED?

If any forms are omitted, select two students to find representatives of the missing forms of energy; then photograph them and add them to the bulletin board display.

## TEACHING STRATEGIES

THAT YOU HAVE COMPLETED YOUR ENERGY CHARTS,  
US SEE WHAT KIND OF ENERGY IS BEING USED IN  
SCHOOL ENVIRONMENT.

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n them and add them to the bulletin board dis-

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-2

21

Students:

--discuss picture, giving the type of energy it  
represents.

--respond, "Yes," "No," "I think so."

UNIT III, CORE A  
ACTIVITY 3-2: "Getting Corked Off"

Activity name suggested by class:

Teacher

BSCS USE:	Post	Day 3	Day 4	Day 5	Rev

Day 1 Day 2 Day 3 Day 4 Day 5 Day 6

1. Date taught (month and date, e.g. 11/2)						
2. Minutes of class time on science each day						
3. Minutes of preparation each day						
4. Students absent on each date (Use ID Number)						

5. Interest of class as expressed by apparent attention to what is happening.Number of students responding with: Name students you noted especially:  
(Number)

HIGH INTEREST					
MODERATE INTEREST					
INDIFFERENCE					
MODERATE RESISTANCE					
STRONG DISLIKE					
HARD TO RATE					

6. Equipment in kit: ☐ None ☐ Satisfactory ☐ Too fragile ☐ Too complicated to use ☐ Difficult to use7. Equipment I got: ☐ None needed to get ☐ Easy to get but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

Materials used:	Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:

☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless  
--keep as is revision suggested major changes described --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

Equipment I got: ☐ None ☐ Easy ☐ Hard to get, ☐ Hard to get, ☐ Unobtainable,  
needed to get but okay add to kit add to kit

8. Materials used:

	Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:
10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:
11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:
12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?
13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:
14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:
15. Your rating of this activity:  
☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless  
--keep as is revision suggested major changes described --drop it  
SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed.  
What parts of this activity should be retained when the curriculum is revised?  
Page(s) \_\_\_\_\_:

17. How many students appeared to know about various sources or kinds of energy?  
☐ None ☐ 1/4 ☐ 1/2 ☐ 3/4 ☐ All: Comment.

18. List every student whose poster did not contain three acceptable examples of each type of energy: \_\_\_\_\_

19. Concern (or questions) about content: \_\_\_\_\_

20. Messages for staff (read immediately): \_\_\_\_\_

BSCS Evaluation: EMH Feedback Form 1c

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?



UNIT III, CORE A  
ACTIVITY 3-2: "Getting Corked Off"

Teacher \_\_\_\_\_

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.



## Me and my Environment

### OBJECTIVE FOCUS FOR THIS ACTIVITY

#### UNIT GOALS:

1. Realize and appreciate the energy inter-relationships between organisms.

#### CORE A OBJECTIVES:

1. Define energy as "anything that causes something to move or change."
2. Recognize that the ability to move or cause movement requires energy.
3. Recognize that the amount of and the rate at which work is done is related to the amount of energy input.

### MATERIALS

- 3 Beakers, Pyrex (400 ml)
- \*Ice for ice water
- Hot plate or stove
- \*Hot pad for handling beaker
- 2 Petri dishes per pair of students
- \*2 Spoons per pair of students

(Continued on next page)

\*Not furnished in materials kit

### TEACHING STRATEGIES

#### Activity 3-3. Experimenting With Heat Energy

*Through experimentation, the student will associate doing and the rate of doing something with energy. This builds background information for later activities which associate food with energy. More experience in predicting events, comparing conditions, and recording information is provided. Students also will have more experiences working cooperatively with others.*

#### Teacher Preparation:

1. Begin heating water in a Pyrex beaker on the hot plate 20-30 minutes before the science period. Be sure to use a hot plate or stove to heat the water, since heat from an appliance such as a food warmer is not sufficient to bring water to a boil.
2. Have a beaker containing ice cubes and water ready.

### FOCUS FOR THIS ACTIVITY

#### GOALS:

1. Realize and appreciate the energy inter-relationships between organisms.

#### OBJECTIVES:

1. Define energy as "anything that causes something to move or change."
2. Recognize that the ability to move or cause movement requires energy.
3. Recognize that the amount of and the rate at which work is done is related to the amount of energy input.

### TEACHING STRATEGIES

#### 3. Experimenting With Heat Energy

Experimentation, the student will associate the rate of doing something with energy. This background information for later activities which deal with energy. More experience in pre-experiments, comparing conditions, and recording data is provided. Students also will have more experience working cooperatively with others.

#### Preparation:

Boil heating water in a Pyrex beaker on the hot plate 20-30 minutes before the science period. Be sure to use a hot plate or stove to heat the water, since heat from an appliance such as a space warmer is not sufficient to bring water to a boil.

Prepare a container containing ice cubes and water ready.

### UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

#### CORE A. INTRODUCTION TO ENERGY



**BSCS**

#### ACTIVITY 3-3. EXPERIMENTING WITH HEAT ENERGY

### ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

- have predicted at what temperature water can move something fastest.
- have associated more movement, more rapid movement, and more energy with higher temperatures.
- have performed the experiment, collected data, and discussed the results.

# ACTIVITY 3-3

24

## MATERIALS

Potassium permanganate crystals  
Worksheets 3-1 and 3-2

\*Overhead projector

Transparency 3-1 (of Worksheets  
3-1 and 3-2)

Slides 3-1 and 3-2

\*Timer or wall clock with second  
hand

2 Beakers (250 ml)

Tweezers

\*35mm Slide projector

\*Not furnished in materials kit

## TEACHING STRATEGIES

3. Use caution in handling the potassium permanganate. It is poisonous. Do not get it on the skin. If the chemical is spilled on the skin, flush immediately with water.
4. A solid, level surface is necessary for the crystal activity. If your room has slanted desks or tables that bump easily, have the students do the activity on the floor.
5. Practice the crystal movement demonstration before class.

Display the beaker of ice water and fill another beaker with water from the tap.

Then ask:

IS THE WATER IN THESE TWO CONTAINERS THE SAME?

HOW ARE THEY DIFFERENT?

Select a student to come up and feel both beakers of water.

Then ask:

WHICH OF THESE IS COLDER?

WHICH OF THESE IS WARMER?

WHICH ONE CONTAINS MORE HEAT ENERGY?

## TEACHING STRATEGIES

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ty. If your room has slanted desks or tables  
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ce the crystal movement demonstration before

beaker of ice water and fill another beaker  
from the tap.

WATER IN THESE TWO CONTAINERS THE SAME?

THEY DIFFERENT?

ent to come up and feel both beakers of water.

THESE IS COLDER?

THESE IS WARMER?

E CONTAINS MORE HEAT ENERGY?

## ANTICIPATED STUDENT BEHAVIORS

Students:

--respond, "No."

--compare and differentiate between the two beakers  
by saying, "One has ice water in it and the other  
has water you just got from the faucet."

--identify the one with cold water.

--identify the one with tap water.

--associate a higher temperature with a greater  
level of energy and respond, "Tap water has  
more energy than ice water."

## MATERIALS

## TEACHING STRATEGIES

WHAT WOULD I HAVE TO DO TO GIVE THE TAP WATER MORE HEAT ENERGY?

Continue by placing these two beakers next to the one that is boiling and say:

I HAVE SOME WATER BOILING ON THE HOT PLATE.  
(Point to the boiling water.)

LET'S MAKE SOME PREDICTIONS. DOES ANYONE KNOW WHAT A PREDICTION IS?

WHICH OF THE THREE BEAKERS OF WATER HAS THE MOST ENERGY?

WHICH OF THE THREE TEMPERATURES OF WATER COULD MOVE OR CHANGE THINGS THE FASTEST? WHICH COULD MOVE OR CHANGE THINGS THE SLOWEST?

LET'S DO AN EXPERIMENT TO FIND IF OUR PREDICTIONS ARE RIGHT.

Divide the class into groups of two and distribute two petri dishes and two spoons to each group.



DISTRIBUTE MAT

## TEACHING STRATEGIES

COULD I HAVE TO DO TO GIVE THE TAP WATER  
HEAT ENERGY?

placing these two beakers next to the one that  
and say:

SOME WATER BOILING ON THE HOT PLATE.  
to the boiling water.)

MAKE SOME PREDICTIONS. DOES ANYONE KNOW  
PREDICTION IS?

OF THE THREE BEAKERS OF WATER HAS THE  
ENERGY?

OF THE THREE TEMPERATURES OF WATER COULD  
R CHANGE THINGS THE FASTEST? WHICH COULD  
R CHANGE THINGS THE SLOWEST?

DO AN EXPERIMENT TO FIND IF OUR PREDICTIONS  
GHT.

class into groups of two and distribute two  
s and two spoons to each group.

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-3

25

Students:

--recall from the cork popping demonstration in  
Activity 3-2 that more heat would provide more  
energy and, therefore, reply, "Heat it up."

--respond, "A guess," "Trying to figure out what's  
going to happen."

--recall the relationship between the amount of  
heat and energy and state that the beaker of  
boiling water has more energy.

--recall the relationship between energy and movement  
or change and predict boiling water and ice water  
respectively.



ACTIVITY 3-3

26

MATERIALS

TEACHING STRATEGIES

Say:

IF WE FILLED ONE OF THE DISHES WITH BOILING WATER AND THE OTHER WITH ICE WATER, AT WHAT TEMPERATURE OF WATER WOULD A CHEMICAL MOVE THROUGH THE WATER THE FASTEST?

Before distributing crystals, say:

DO NOT PICK UP YOUR SPOON, OR PUT ANYTHING INTO THE DISHES UNTIL I TELL YOU TO.

Pour a small amount of potassium permanganate into a petri dish, beaker, or small jar. Distribute to each student a crystal of potassium permanganate by using the tweezers to place a crystal in the student's spoon. It is important that the crystals going to the members of each team be about the same size.

I HAVE GIVEN YOU SOME CRYSTALS OF A PURPLE CHEMICAL THAT WE ARE GOING TO USE. THEY ARE POISONOUS AND WILL CAUSE STAINS, SO DO NOT TOUCH THEM OR PICK THEM UP. AFTER I PASS OUT THE CRYSTALS, YOU WILL PUT THEM IN YOUR DISHES OF HOT AND COLD WATER. WHEN DOING THIS DO NOT BUMP THE DISH OR STIR THE WATER.

WHAT DO YOU THINK WOULD HAPPEN IF YOU DID BUMP IT?

WE WILL FILL ONE DISH WITH ICE WATER AND ONE DISH WITH BOILING WATER. AFTER THE WATER IS POURED I WILL GIVE YOU A SIGNAL TO DROP THE CRYSTAL INTO THE CENTER OF THE DISH. DO NOT DROP THE CRYSTAL INTO THE DISH UNTIL I TELL YOU TO. TRY TO DROP THE CRYSTAL AS CLOSE TO THE CENTER OF THE DISH AS POSSIBLE.



## TEACHING STRATEGIES

FILLED ONE OF THE DISHES WITH BOILING WATER  
OTHER WITH ICE WATER, AT WHAT TEMPERATURE  
WOULD A CHEMICAL MOVE THROUGH THE WATER  
TEST?

buting crystals, say:

PICK UP YOUR SPOON, OR PUT ANYTHING INTO  
ES UNTIL I TELL YOU TO.

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or small jar. Distribute to each student a  
tassium permanganate by using the tweezers  
ystal in the student's spoon. It is impor-  
crystals going to the members of each team  
same size.

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THAT WE ARE GOING TO USE. THEY ARE  
S AND WILL CAUSE STAINS, SO DO NOT  
EM OR PICK THEM UP. AFTER I PASS  
CRYSTALS, YOU WILL PUT THEM IN YOUR  
F HOT AND COLD WATER. WHEN DOING THIS  
UMP THE DISH OR STIR THE WATER.

YOU THINK WOULD HAPPEN IF YOU DID

FILL ONE DISH WITH ICE WATER AND ONE  
H BOILING WATER. AFTER THE WATER IS  
WILL GIVE YOU A SIGNAL TO DROP THE  
INTO THE CENTER OF THE DISH. DO NOT  
CRYSTAL INTO THE DISH UNTIL I TELL  
TRY TO DROP THE CRYSTAL AS CLOSE TO  
E DISH AS POSSIBLE.

## ANTICIPATED STUDENT BEHAVIORS

Students:

--recall the relationships between heat, energy,  
and movement and predict that the hottest water  
will cause the greatest movement.

--predict it would move the crystal around or in  
some way disturb the experiment.

## MATERIALS

## TEACHING STRATEGIES

Before filling the dishes ask:

WHAT ARE WE TRYING TO FIND OUT BY DOING THIS EXPERIMENT?

Now completely fill the dishes with water by having a student fill one dish per team with ice water and the teacher fill the other dish with boiling water. Remind each student that he is "in charge" of one of the dishes, that he is responsible for observing, and that he will be responsible later for the data from that particular dish.

When water has been distributed say:

CAREFULLY PICK UP YOUR SPOONS. HOLD THEM JUST ABOVE THE WATER. AT MY SIGNAL DROP THE CRYSTAL IN THE VERY CENTER OF THE DISH.

DROP THE CRYSTAL.

Allow students to observe dishes for two or three minutes.

Then ask:

WHAT DO YOU SEE HAPPENING?

If students have not indicated they notice a difference of dispersion in the two dishes, ask:

IN WHICH DISH IS THE COLOR SPREADING THE FASTEST?

## TEACHING STRATEGIES

ng the dishes ask:

WE TRYING TO FIND OUT BY DOING THIS  
MENT?

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one dish per team with ice water and the  
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E CRYSTAL.

ts to observe dishes for two or three minutes.

YOU SEE HAPPENING?

students have not indicated they notice  
difference of dispersion in the two dishes,  
k:

WHICH DISH IS THE COLOR SPREADING THE  
BEST?

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-3

(27)

Students:

--recall that we are trying to find out what  
temperature has the most energy.

--should drop crystal in water and observe color  
movement as crystal dissolves.

--respond, "The purple color is moving," "The color  
is spreading out," "It's moving," "It's melting,"  
"It's spreading faster in the hot water."

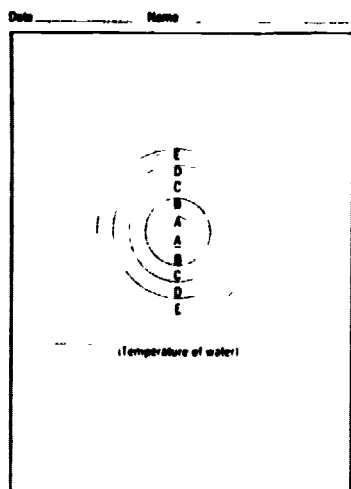
--respond, "In the hot water."

# ACTIVITY 3-3

28

## MATERIALS

### Transparency 3-1



## TEACHING STRATEGIES

WHY DOES IT MOVE FASTER IN THE HOT WATER?

Have students empty their dishes, being careful to rinse any remaining crystal out of the dish and try not to splash any on their clothes.

Place Transparency 3-1 of Worksheets 3-1 and 3-2 on the overhead projector and place a petri dish of water at room temperature on the concentric circles. Prepare to add a crystal of permanganate to the dish. If a wall clock with a second hand is not available obtain a wrist watch with a second hand.

Say:

AFTER I DROP THE CRYSTAL IN THE WATER, LET'S WATCH TO SEE HOW LONG IT TAKES FOR THE COLOR TO MOVE OUT INTO THE DISH. WE WILL WATCH THE CLOCK AND AT THE END OF EACH MINUTE I WILL MARK WITH ONE OF THESE LETTERS (point to the letters on the circle) HOW FAR IT HAS MOVED FROM THE CENTER OF THE DISH. IF THE MOVEMENT IS NOT EVEN, LOOK FOR THE FARTHEST POINT THE COLOR HAS MOVED TO.

Proceed with the demonstration by placing a crystal in the center of the dish. After one minute has passed, ask:

WHICH LINE IS THE COLOR CLOSEST TO?

DEMONSTRATE



## TEACHING STRATEGIES

Y DOES IT MOVE FASTER IN THE HOT WATER?

s empty their dishes, being careful to rinse  
g crystal out of the dish and try not to splash  
clothes.

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on the concentric circles. Prepare to add a  
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d is not available obtain a wrist watch with  
d.

DROP THE CRYSTAL IN THE WATER, LET'S  
D SEE HOW LONG IT TAKES FOR THE COLOR  
OUT INTO THE DISH. WE WILL WATCH THE  
ND AT THE END OF EACH MINUTE I WILL MARK  
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OF THE DISH. IF THE MOVEMENT IS NOT  
OOK FOR THE FARTHEST POINT THE COLOR HAS  
D.

DEMONSTRATE



the demonstration by placing a crystal in the  
e dish. After one minute has passed, ask:

NE IS THE COLOR CLOSEST TO?

## ANTICIPATED STUDENT BEHAVIORS

Students:

--recall the relationship between heat energy and  
movement and conclude, "Because the hot water  
has more energy."

--respond with probably A or B.

## MATERIALS

## TEACHING STRATEGIES

SINCE THE COLOR IS CLOSEST TO LINE (A) WE WILL MARK DOWN THE LETTER "A" AFTER ONE MINUTE HERE.

Fill in the appropriate space on the transparency. Continue to record data in a like manner for the next three to four minutes.

Now say:

THIS WATER I JUST USED IS TAP WATER AT ROOM TEMPERATURE. IT'S NOT VERY HOT OR COLD.

Point to the boiling water and ask:

IS IT HOTTER OR COLDER THAN THIS WATER?

SINCE THIS IS TAP WATER AT ROOM TEMPERATURE, IT'S NOT VERY HOT OR COLD.

WHAT WILL HAPPEN IF WE PUT THE CRYSTAL IN THE HOT WATER?

RAISE YOUR HAND IF YOU THINK THE COLOR WILL MOVE FASTER IN THE COLD WATER.

RAISE YOUR HAND IF YOU THINK THE COLOR WILL MOVE FASTER IN THE HOT WATER.

Record on the board the number of students who predict the color will move faster in cold water and the number who predict it will move faster in hot.

This can be an indication to you if the students are following along and understanding the procedure.

Now ask:

## TEACHING STRATEGIES

THE COLOR IS CLOSEST TO LINE (A) WE  
MARK DOWN THE LETTER "A" AFTER ONE MINUTE

the appropriate space on the transparency. Con-  
record data in a like manner for the next three  
minutes.

WATER I JUST USED IS TAP WATER AT ROOM  
TEMPERATURE. IT'S NOT VERY HOT OR COLD.

the boiling water and ask:

HOTTER OR COLDER THAN THIS WATER?

THIS IS TAP WATER AT ROOM TEMPERATURE,  
NOT VERY HOT OR COLD.

WILL HAPPEN IF WE PUT THE CRYSTAL IN THE  
WATER?

YOUR HAND IF YOU THINK THE COLOR WILL  
FASTER IN THE COLD WATER.

YOUR HAND IF YOU THINK THE COLOR WILL  
FASTER IN THE HOT WATER.

the board the number of students who predict  
will move faster in cold water and the number  
it will move faster in hot.

an indication to you if the students are  
along and understanding the procedure.

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-3

29

Students:

--respond, "Colder."

--predict, "It will move faster."

--no one should raise hands.

--all should raise hands.

# ACTIVITY 3-3

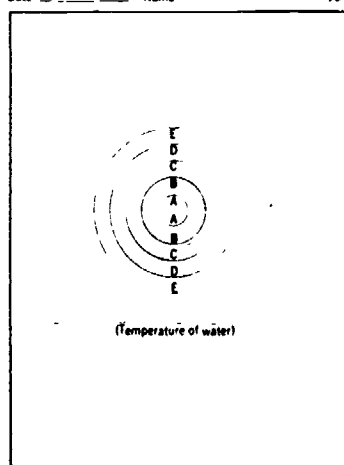
30

## MATERIALS

Slide 3-1

Worksheet 3-1

Date \_\_\_\_\_ Name \_\_\_\_\_



Slide 3-2

Worksheet 3-2

Date \_\_\_\_\_ Name \_\_\_\_\_

\_\_\_\_\_ (Temperature of water)

My prediction is that the color will  
fastest in \_\_\_\_\_ water  
(hot or cold)

Movement of color  
(Mark A, B, C, D, or E)

1 Minute	
2 Minutes	
3 Minutes	
4 Minutes	
5 Minutes	

## TEACHING STRATEGIES

HOW CAN WE FIND OUT FOR SURE WHICH PREDICTION IS  
CORRECT?

Distribute Worksheets 3-1 and 3-2 to each student. Have each team designate one person to experiment with the hot water and one the cold water. Have students identify which temperature of water they are working with by marking hot or cold under the circle on the Worksheet 3-1 and marking hot or cold in the appropriate spot at the top of Worksheet 3-2. Have each student write his prediction in the appropriate place on Worksheet 3-2.

Distribute potassium permanganate crystals and water as before. Instruct the students to place their petri dish of water over the outline on Worksheet 3-1.

Again have students drop the crystals into the dishes at a given signal, emphasizing that they observe and record what happens in their own dishes.

After one minute say:

MARK ON YOUR WORKSHEET 3-2 NEXT TO ONE MINUTE,  
WHERE THE COLOR IS IN YOUR DISH.

It may be helpful to point out again the appropriate place on the worksheets where they are to record their data.

At each succeeding minute interval have students mark their worksheets. When students have finished observing and recording say:

ACCEPT ALL  
ANSWERS



## TEACHING STRATEGIES

WE FIND OUT FOR SURE WHICH PREDICTION IS

worksheets 3-1 and 3-2 to each student. Have designate one person to experiment with the hot the cold water. Have students identify which of water they are working with by marking hot the circle on the Worksheet 3-1 and marking in the appropriate spot at the top of Worksheet each student write his prediction in the appro- on Worksheet 3-2.

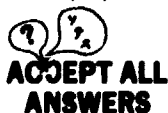
potassium permanganate crystals and water as instruct the students to place their petri dish the outline on Worksheet 3-1.

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YOUR WORKSHEET 3-2 NEXT TO ONE MINUTE, THE COLOR IS IN YOUR DISH.

pful to point out again the appropriate place eets where they are to record their data.



eding minute interval have students mark their When students have finished observing and :

## ANTICIPATED STUDENT BEHAVIORS

Students:

--suggest, "Putting the crystal in hot or cold water like we did before."

--drop their crystals, and observe color movement.

--mark appropriate letter on the worksheet.

## MATERIALS

## TEACHING STRATEGIES

COMPARE YOUR RECORD WITH YOUR PARTNER'S. IN WHICH DISH DID THE CHEMICAL MOVE FASTEST?

WAS YOUR PREDICTION CORRECT? DID THE CHEMICAL MOVE FASTEST IN THE DISH YOU SAID IT WOULD?

WHY DID THE CHEMICAL IN THE DISH WITH THE HOTTEST WATER MOVE THE MOST?

WHICH DISH OF WATER STARTED WITH THE MOST ENERGY?

WHICH WATER MADE THE CRYSTAL MOVE THE FASTEST?

WHY DID THE COLD WATER MAKE THE CRYSTAL MOVE THE SLOWEST?

## TEACHING STRATEGIES

ARE YOUR RECORD WITH YOUR PARTNER'S. IN  
DISH DID THE CHEMICAL MOVE FASTEST?

OUR PREDICTION CORRECT? DID THE CHEMICAL  
FASTEST IN THE DISH YOU SAID IT WOULD?

DID THE CHEMICAL IN THE DISH WITH THE  
ST WATER MOVE THE MOST?

DISH OF WATER STARTED WITH THE MOST ENERGY?

WATER MADE THE CRYSTAL MOVE THE FASTEST?

DID THE COLD WATER MAKE THE CRYSTAL MOVE  
LOWEST?

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-3

31

Students:

--compare worksheets and conclude that the color  
moved fastest in the hot water.

--check the validity of their predictions.

--infer it had the most energy.

--recall that the dish with the hottest water started  
with the most energy.

--respond, "The hot water."

--associate slower movement with a lesser amount  
of energy.

UNIT III, CORE A  
ACTIVITY 3-3: "Experimenting With Heat Energy"

Activity name suggested by class: \_\_\_\_\_ Teacher \_\_\_\_\_

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
Date taught (month and date, e.g. 11/2)						
Minutes of class time on science each day						
Minutes of preparation each day						
Students absent on each date (Use ID Number)						

BSCS USE: Post \_\_\_\_\_ Tally \_\_\_\_\_ Rev \_\_\_\_\_

1.	Date taught (month and date, e.g. 11/2)					
2.	Minutes of class time on science each day					
3.	Minutes of preparation each day					
4.	Students absent on each date (Use ID Number)					

5. Interest of class as expressed by apparent attention to what is happening.Number of students responding with: \_\_\_\_\_ Name students you noted especially: \_\_\_\_\_  
(Number)

HIGH INTEREST	_____
MODERATE INTEREST	_____
INDIFFERENCE	_____
MODERATE RESISTANCE	_____
STRONG DISLIKE	_____
HARD TO RATE	_____

6. Equipment in kit: ☐ None ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use
7. Equipment I got: ☐ None ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:
10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:
11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:
12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?
13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:
14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:

☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless

--keep as is revision suggested major changes described --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

Equipment I got: ☐ None ☐ Easy ☐ Hard to get, ☐ Unobtainable, add to kit  
needed to get but okay add to kit

Materials used:

	Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:
10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:
11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:
12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?
13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:
14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:

☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless  
---keep as is revision suggested major changes described ---drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed.  
What parts of this activity should be retained when the curriculum is revised?  
Page(s) \_\_\_\_\_:

17. On the second experiment with the crystals and hot and cold water (Worksheet 3-2),  
how many students predicted the color would move faster in the cold water?  
\_\_\_\_\_ students.

18. How many students had difficulty observing and recording results on Worksheet 3-2?  
☐ None ☐ 1/4 ☐ 1/2 ☐ 3/4 ☐ All: Comment.

19. Collect and send in student Worksheet 3-2.

20. Concern (or questions) about content:

21. Messages for staff (read immediately):

BSCS Evaluation: EMH Feedback Form 1c

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

SIDE A

UNIT III, CORE A  
ACTIVITY 3-3: "Experimenting With Heat: Energy"

Teacher \_\_\_\_\_

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.



## Me and my Environment

### OBJECTIVE FOCUS FOR THIS ACTIVITY

#### UNIT GOALS:

1. Realize and appreciate the energy inter-relationships between organisms.

#### CORE A OBJECTIVES:

1. Define energy as "anything that causes something to move or change."
2. Recognize that the ability to move or cause movement requires energy.
3. Recognize that the amount of and the rate at which work is done is related to the amount of energy input.

### MATERIALS

Slide 3-3  
Worksheet 3-3 (Front)  
\*2 Tea bags

(Continued on next page)

\*Not furnished in materials kit

### TEACHING STRATEGIES

#### Activity 3-4. Hot Or Cold -- A Review Of Success

*The purpose of the demonstration is to assess the success of Activity 3-3. It will help make the student aware of what he has learned and provides you an opportunity to reinforce his success through praise.*

Pass out Worksheet 3-3 and direct each student to write his name on it. Have ready hot water and cold water, two medium size beakers or clean glasses, and two tea bags. Write on the chalkboard the words "hot" and "cold."

Now say:

**FOCUS FOR THIS ACTIVITY****GOALS:**

1. Realize and appreciate the energy inter-relationships between organisms.

**OBJECTIVES:**

1. Define energy as "anything that causes something to move or change."
2. Recognize that the ability to move or cause movement requires energy.
3. Recognize that the amount of and the rate at which work is done is related to the amount of energy input.

**TEACHING STRATEGIES****3-4. Hot Or Cold -- A Review Of Success**

of the demonstration is to assess the success of the demonstration. It will help make the student aware of what has been learned and provides you an opportunity to praise his success through praise.

Worksheet 3-3 and direct each student to write on it. Have ready hot water and cold water, two size beakers or clean glasses, and two tea bags. Write on the chalkboard the words "hot" and "cold."

**UNIT III. ENERGY RELATIONSHIPS  
IN MY ENVIRONMENT****CORE A. INTRODUCTION TO ENERGY****BSCS****ACTIVITY 3-4. HOT OR COLD -- A REVIEW OF SUCCESS****ANTICIPATED STUDENT BEHAVIORS**

At the end of this activity, each student should:

- have correctly predicted which of the two beakers of tea would be ready first.
- have observed the demonstration and compared the results with his prediction.
- understand why his prediction was correct (or incorrect).
- have inferred water temperature from movement of crystal color in the water.

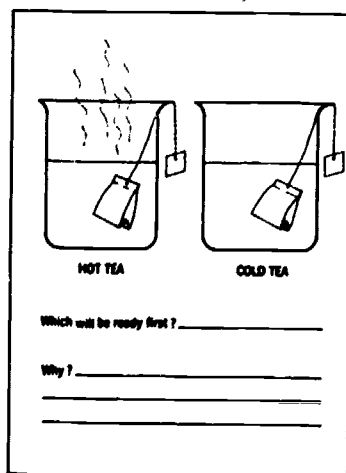


# ACTIVITY 3-4

34

## MATERIALS

- \*Hot and cold water
- 2 Pyrex beakers
- \*Paper
- \*35mm Slide projector
- Slide 3-3
- Worksheet 3-3 (Back)



\*Not furnished in materials kit

## TEACHING STRATEGIES

I AM GOING TO FIX MYSELF SOME TEA IN THESE TWO BEAKERS. IN ONE I WILL POUR COLD WATER AND IN THE OTHER I WILL POUR HOT WATER. IN THIS SPACE ON THE BACK OF YOUR WORKSHEET WRITE THE WORD "HOT" (point to the word on the chalkboard) IF YOU THINK THE HOT TEA WILL BE READY FIRST OR WRITE THE WORD "COLD" (again point) IF YOU THINK THE COLD TEA WILL BE READY FIRST.

Then say:

I ALSO WANT YOU TO WRITE WHY YOU HAVE PREDICTED "HOT" OR WHY YOU HAVE PREDICTED "COLD."

Assist students in their writing where necessary.

Add water and tea to the beakers.

While waiting for the tea to diffuse through the water, continue with the following.



## TEACHING STRATEGIES

ING TO FIX MYSELF SOME TEA IN THESE TWO  
IN ONE I WILL POUR COLD WATER AND IN  
ER I WILL POUR HOT WATER. IN THIS SPACE  
BACK OF YOUR WORKSHEET WRITE THE WORD  
(point to the word on the chalkboard) IF  
K THE HOT TEA WILL BE READY FIRST OR WRITE  
"COLD" (again point) IF YOU THINK THE  
WILL BE READY FIRST.

WANT YOU TO WRITE WHY YOU HAVE PREDICTED  
WHY YOU HAVE PREDICTED "COLD."

ts in their writing where necessary.

tea to the beakers.



for the tea to diffuse through the water,  
the following.



## ANTICIPATED STUDENT BEHAVIORS

Students:

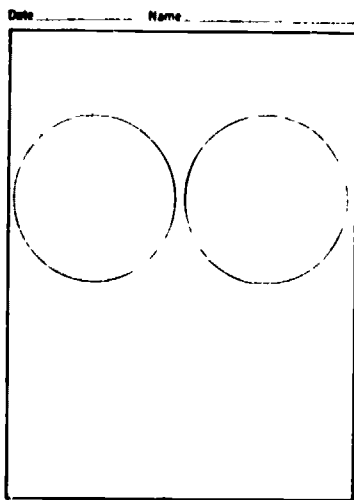
--write "hot" or "cold" on their papers.

--explain in writing why "hot" or "cold" was  
predicted.

## MATERIALS

- \*Overhead projector
- Transparency 3-2
- 2 Petri dishes
- 2 Crystals of potassium permanganate
- 1 Pair of tweezers
- 2 Pyrex beakers
- \*Cold and hot water

Transparency 3-2



\*Not furnished in materials kit

## TEACHING STRATEGIES

Project Transparency 3-2 and place two petri dishes on the transparency. Stand between the students and the overhead projector, or place something between it and the students so they cannot observe which of the dishes you fill with hot or cold water. Fill one petri dish with hot water and the other with cold. Place equal-sized crystals in each dish and instruct the students to observe the movement. While students are observing crystal movement, ask them to turn Worksheet 3-3 over to the front.

After the students have observed for a moment or two, (2 - 3 minutes), ask them to mark an X on the dish which has the warmest water in it. (An alternative may be to write the words "hot" or "cold" on the chalkboard and to have the students write these words in the circles to indicate their predictions.)

Collect worksheets. Quickly note which students, if any, made incorrect predictions.

Now ask:

WHICH DISH HAS THE WARMER WATER IN IT?

WHY DO YOU THINK IT IS THE WARMER?

HOW COULD YOU FIND OUT FOR SURE IF IT IS THE WARMER?

IN WHICH DISH WILL THE COLOR REACH THE EDGE FIRST?

## TEACHING STRATEGIES

transparency 3-2 and place two petri dishes on the  
ncy. Stand between the students and the over-  
ector, or place something between it and the  
so they cannot observe which of the dishes you  
hot or cold water. Fill one petri dish with hot  
the other with cold. Place equal-sized crystals  
ish and instruct the students to observe the move-  
ile students are observing crystal movement, ask  
urn Worksheet 3-3 over to the front.

students have observed for a moment or two,  
nutes), ask them to mark an X on the dish which  
armest water in it. (An alternative may be to  
words "hot" or "cold" on the chalkboard and to  
students write these words in the circles to  
their predictions.)

orksheets. Quickly note which students, if any,  
rect predictions.

DISH HAS THE WARMER WATER IN IT?

DO YOU THINK IT IS THE WARMER?

COULD YOU FIND OUT FOR SURE IF IT IS  
WARMER?

WHICH DISH WILL THE COLOR REACH THE  
FIRST?

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-4

35

Students:

--mark worksheets.

--predict which has the warmer water based upon the  
rate of diffusion (movement of color).

--infer that since it has moved the most it must be  
the warmer.

--respond, "Feel it," "Stick my finger in it,"  
"Use a thermometer."

--predict that the fastest moving color will get  
there first; that the color will reach the edge  
first in the dish with the hottest water.

ACTIVITY 3-4

36

## MATERIALS

## TEACHING STRATEGIES

Make a special effort to involve in the discussion those students who had incorrect predictions on their worksheet. If a majority of students predicted incorrectly you may need to spend more time on this. In any event, have them verify their inference by measuring the temperature of the water.

Ask:

WHAT WORK ARE WE WATCHING THE HEAT ENERGY DO?

Then return attention to the tea bags.

Now say:

WAS YOUR PREDICTION ABOUT THE TEA CORRECT?

WHY WAS THE TEA IN THE HOT WATER READY FIRST?

When the class period has been completed, read each student's prediction and explanation. If it appears that the majority of students do not understand the concept clearly, review the activity with them before proceeding.

## TEACHING STRATEGIES

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y of students do not understand the concept  
view the activity with them before proceeding.

## ANTICIPATED STUDENT BEHAVIORS

Students:

--recall the temperature measuring skill in Unit I  
and apply it here for measuring and recording the  
water temperature of each dish.

--respond, "Move the chemical," "Melt the chemical."

--respond, "Yes."

--respond, "The hot water had the most energy and  
could therefore do the work fastest."

Teacher \_\_\_\_\_  
Date \_\_\_\_\_

UNIT III, CORE A  
TALLYSHEET 3-1: Tally of Worksheet 3-3  
ACTIVITY 3-4: "Hot Or Cold (Review Of Success)"

The sequence of activities in Core A have been dealing with the relationship of the amount of energy available and the speed with which work can be done. The prediction in column 1 deals with the student's awareness that more energy is present. The prediction in column 3 relates work done to the presence of more energy. Column 2 rates the student's ability to verbalize this understanding. It is not expected that all students will be able to explain why, but they should have many opportunities to try to verbalize their ideas. At this point most students should be able to make correct predictions. Their performance should indicate whether a general review is needed or a few students need special help.

Column 1. Prediction of Tea Making. Indicate each student's prediction of which container of tea will be ready first by circling Hot or Cold in column 1.

Column 2. Explanation of Prediction. Rate each student's explanation of why he predicted hot or cold tea using the following categories:

None: no explanation given or does not make sense.

Weak: explanation is vague or misses the point that the notter the water the faster work will be done.

**Good:** explanation includes the ideas that hotter means more energy and faster work.

Column 3. Prediction of Temperature. Circle Right or Wrong to indicate the correctness of each student's prediction of the container that has the warmest water in it.

[illegible]

**Conclusion:** explanation includes the ideas that hotter means more energy and faster work.

Column 3. Prediction of Temperature. Circle Right or Wrong to indicate the correctness of each student's prediction of the container that has the warmest water in it.

**TOTALS:**



UNIT III, CORE A  
ACTIVITY 3-4: "Hot Or Cold" (Review Of Success)

Activity name suggested by class: \_\_\_\_\_

Teacher

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
Date taught (month and date, e.g. 11/2)						
Minutes of class time on science each day						
Minutes of preparation each day						
Students absent on each date (Use ID Number)						

BSCS USE: Post \_\_\_\_\_ Tally \_\_\_\_\_ Rev \_\_\_\_\_

1.	Date taught (month and date, e.g. 11/2)					
2.	Minutes of class time on science each day					
3.	Minutes of preparation each day					
4.	Students absent on each date (Use ID Number)					

5. Interest of class as expressed by apparent attention to what is happening.

Number of students responding with: \_\_\_\_\_ Name students you noted especially: \_\_\_\_\_  
(Number)

HIGH INTEREST	_____
MODERATE INTEREST	_____
INDIFFERENCE	_____
MODERATE RESISTANCE	_____
STRONG DISLIKE	_____
HARD TO RATE	_____

6. Equipment in kit: ☐ None ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use
7. Equipment I got: ☐ None ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:
10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:
11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:
12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?
13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:
14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:
15. Your rating of this activity:  
☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless  
-----keep as is----- revision suggested major changes described -----drop it-----
- SPECIFIC CONCERNS ABOUT THIS ACTIVITY: \_\_\_\_\_

7. Equipment I got: ☐ None ☐ Easy ☐ Hard to get, ☐ Hard to get, ☐ Unobtainable,  
needed to get but okay add to kit add to kit

8. Materials used:

	Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

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11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:  
☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless  
--keep as is revision suggested major changes described --drop it  
SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed.  
What parts of this activity should be retained when the curriculum is revised?  
Page(s) \_\_\_\_\_:

17. Please complete Tallysheet 3-1 and send it in with this feedback sheet. Also send  
in all student Worksheets 3-3.

18. Concern (or questions) about content:

19. Messages for staff (read immediately):

BSCS Evaluation. EMH Feedback Form 1c

UNIT III, CORE A  
ACTIVITY 3-4: "Hot Or Cold" (Review Of Success)

Teacher \_\_\_\_\_

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.



## Me and my Environment

### OBJECTIVE FOCUS FOR THIS ACTIVITY

#### UNIT GOALS:

1. Realize and appreciate the energy inter-relationships between organisms.

#### CORE A OBJECTIVES:

2. Recognize that the ability to move or cause movement requires energy.
3. Recognize that the amount of and the rate at which work is done is related to the amount of energy input.
5. Recognize different forms of energy (heat, light, chemical, and electrical).

### MATERIALS

### TEACHING STRATEGIES

#### Activity 3-5. The Energy Wheel

Through review and experimentation the student will reinforce the concept that heat can cause work to be done and therefore is a form of energy. The student will see that the ability to change something or to cause movement requires energy. The equipment construction and experimentation will reinforce the student's confidence in his own judgment and provide success experiences.

The use of the burning candles provides an opportunity for the discussion of the variety of fuels used by the students and their families (coal, oil, or gas for heating homes; gasoline for cars). The students are asked to begin thinking about what kinds of things supply energy and the finiteness of these resources.

FOCUS FOR THIS ACTIVITY

**GOALS:**

- Realize and appreciate the energy inter-relationships between organisms.

**OBJECTIVES:**

- Recognize that the ability to move or cause movement requires energy.
- Recognize that the amount of and the rate at which work is done is related to the amount of energy input.
- Recognize different forms of energy (heat, light, chemical, and electrical).

**TEACHING STRATEGIES**

**5. The Energy Wheel**

view and experimentation the student will understand the concept that heat can cause work to be done. There is a form of energy. The student will see the ability to change something or to cause movement requires energy. The equipment construction and experimentation will reinforce the student's confidence in the experiment and provide success experiences.

The burning candles provides an opportunity for discussion of the variety of fuels used by the student and their families (coal, oil, or gas for heating, or gasoline for cars). The students are asked to think about what kinds of things supply energy and the usefulness of these resources.

**UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT**

**CORE A. INTRODUCTION TO ENERGY**

**ACTIVITY 3-5. THE ENERGY WHEEL**



**BSCS**

**ANTICIPATED STUDENT BEHAVIORS**

At the end of this activity, each student should:

- have constructed a pinwheel.
- have used heat from the candles to make the pinwheel turn.
- have made predictions about the speed of the turning pinwheel as a result of varying the number of candles or the distance of the candle(s) from the wheel.
- have done experiments to check predictions.
- be able to explain that the candle supplied the heat energy that turned the pinwheel.
- list alternate forms of energy which might cause the pinwheel to work.
- infer and predict the present and future availability of fuels which supply energy.

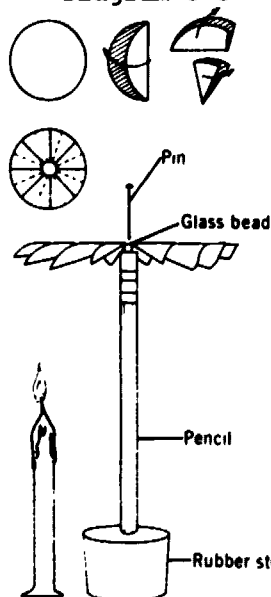
# ACTIVITY 3-5

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## MATERIALS

- \*Heavy-duty aluminum foil
- \*Large size birthday candles (2 per student)
- \*Pencil with eraser (1 per student)
- \*Straight pin (1 per student)
- \*Scissors (1 per student)
- 1 Glass bead per student
- Rubber stopper with holes (1 per student), Size 8
- \*Matches
- \*Cardboard or heavy paper
- \*Quarter
- Worksheet 3-4
- Slides 3-4 through 3-7
- \*35mm Slide projector

Diagram 3-3



\*Not furnished in materials kit

## TEACHING STRATEGIES

### Teacher Preparation:

1. Preparation and organization of the materials is very important to the success of this activity. The teacher should construct in advance a pinwheel to be used as a demonstration model. Know that it works before using it with the class! Prepare ahead of time the foil circles by tracing and cutting around a petri dish on heavy-duty aluminum foil. Sheets or pieces of cardboard or heavy paper should be available for the student to set the candles and pinwheel apparatus on. This prevents wax from dropping onto the table surface.
2. Water should be handy to extinguish any accidental fires.
3. The design suggested has been tested and should work regularly. However, you and your students might want to experiment with different designs; you might find one that works better.

### Now ask:

CAN ANYONE THINK OF ANY OTHER MACHINES THAT USE HEAT ENERGY TO MAKE THEM WORK?

### Now say:

YOU HAVE NAMED SOME MACHINES THAT USE HEAT ENERGY TO MAKE THEM WORK. WE'RE NOW GOING TO MAKE OUR OWN MACHINE.

Help the students to construct their own pinwheel by using the following directions. See Diagram 3-3.

## TEACHING STRATEGIES

### Preparation:

Preparation and organization of the materials is important to the success of this activity. The teacher should construct in advance a pinwheel to use as a demonstration model. Know that it will be used before using it with the class! Prepare ahead of time the foil circles by tracing and cutting around a petri dish on heavy-duty aluminum sheets or pieces of cardboard or heavy paper that will be available for the student to set the foil circles and pinwheel apparatus on. This prevents the foil from dropping onto the table surface.

A fire extinguisher should be handy to extinguish any accidental fires.

The design suggested has been tested and should work regularly. However, you and your students may want to experiment with different designs; they might find one that works better.

DO YOU THINK OF ANY OTHER MACHINES THAT USE HEAT ENERGY TO MAKE THEM WORK?

WE'VE NAMED SOME MACHINES THAT USE HEAT ENERGY TO MAKE THEM WORK. WE'RE NOW GOING TO CONSTRUCT OUR OWN MACHINE.

Students to construct their own pinwheel by using the following directions. See Diagram 3-3.

## ANTICIPATED STUDENT BEHAVIORS

Students:

--respond, "Stove," "Car," "Furnace," "Welding torch," "Iron," "Dryer," "Gun."

## MATERIALS

## TEACHING STRATEGIES

1. Supply the circle which has already been cut to the size of a petri dish from aluminum foil.
  2. Fold the aluminum foil circle three times -- into halves, fourths, and eighths.
  3. Unfold the circle and place a quarter in the center of the circle. Trace around the quarter with a pencil.
  4. Cut along the lines of the circle that correspond to the crossed lines of the diagram, and stop at the small circle made by tracing the quarter.
  5. Fold down the left side of each of the eight leaves produced by cutting, as in the diagram or model.
  6. With a straight pin through the center of the wheel, mount the wheel to a pencil eraser, inserting a small glass bead between the wheel and the eraser. See Diagram 3-3. It is important to include a glass bead to reduce the friction between the eraser and the wheel.
  7. Support the machine in an upright position by pushing the pencil into the hole of the rubber stopper.
  8. Starting with only one lighted birthday candle, hold or place the candle under the wheel in such a position that it causes the wheel to start to move.
- Hint: Any or all wheels may not turn because of one or more of the following conditions.



## TEACHING STRATEGIES

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n that it causes the wheel to start to move.

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f the following conditions.

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-5

39

Students:

--construct heat wheels and make them work.

ACTIVITY 3-5

40

## MATERIALS

## TEACHING STRATEGIES

1. Candle too small or one candle not enough.  
(It may be necessary to add another candle to get initial movement.)
2. Length of pencil is too long.
3. Air drafts in the room counter the effect of the heat.
4. Pin may not be through the center of the wheel.
5. Blades bent improperly.

It may be necessary to change one or more of the above conditions in order for the wheel to turn freely.



SAVE THE PINWHEEL FOR L

Once the students have their wheels working, the teacher, with small groups or individuals, should suggest:

SEE IF YOU CAN DISCOVER A WAY TO MAKE THE WHEEL GO FASTER.

Check individual progress.

As students discover one way of increasing speed, ask them to explain why, and then suggest they try to find another way.

## TEACHING STRATEGIES

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ades bent improperly.

ecessary to change one or more of the above  
order for the wheel to turn freely.



## SAVE THE PINWHEEL FOR LATER ACTIVITY

ents have their wheels working, the teacher,  
roups or individuals, should suggest:

OU CAN DISCOVER A WAY TO MAKE THE WHEEL  
R.

ual progress.

discover one way of increasing speed, ask them  
y, and then suggest they try to find another

## ANTICIPATED STUDENT BEHAVIORS

Students:

--experiment with such things as more candles,  
candles higher, or bigger candles to try to  
make the heat wheel go faster.

--perform experiments and check predictions.

## MATERIALS

## TEACHING STRATEGIES



When the students have completed their experiments, ask:

WHO CAN TELL ME HOW THIS MACHINE WORKS?

WHO WAS ABLE TO MAKE IT GO FASTER?

WHY DID IT GO FASTER?

You should expect in these last two explanations such concepts as: candle burning produced heat; heat is energy; energy caused the machine to turn; more heat makes it go faster.



If these concepts are not reached, relate the working of this machine to previous heat-energy experiments where heat did the work of moving the potassium permanganate and popping the cork.

Then ask:

ARE THERE ANY OTHER WAYS WE CAN MAKE OUR PIN-WHEELS TURN BESIDES USING BURNING CANDLES?

## TEACHING STRATEGIES

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-5

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Students:



Students have completed their experiments, ask:

TELL ME HOW THIS MACHINE WORKS?

--identify the components that make the machine work and conclude that the candles are providing heat and the heat energy is causing the wheel to turn (to work).

ABLE TO MAKE IT GO FASTER?

--indicate that adding more heat would add more energy and therefore make the wheel spin faster.

IT GO FASTER?

Expect in these last two explanations such  
candle burning produced heat; heat is energy;  
and the machine to turn; more heat makes it go



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to previous heat-energy experiments where  
work of moving the potassium permanganate  
the cork.

RE ANY OTHER WAYS WE CAN MAKE OUR PIN-  
TURN BESIDES USING BURNING CANDLES?

--respond, "Yes," "No," "I don't know."

# ACTIVITY 3-5

## MATERIALS

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### Worksheet 3-4

Date \_\_\_\_\_ Name \_\_\_\_\_

LOOK AT THE DIAGRAMS BELOW

1. WHICH OF THE TEST TUBES OF WATER WILL POP THE CORN THE FASTEST?  
☐ A ☐ B ☐ C ☐ D  
 MARK AN X ON YOUR CHOICE.

2. WHICH TEST TUBE OF WATER IS RECEIVING THE MOST ENERGY?  
☐ A ☐ B ☐ C ☐ D  
 MARK AN X ON YOUR CHOICE.

3. WHICH TEST TUBE OF WATER IS ABLE TO DO THE LEAST AMOUNT OF WORK?  
☐ A ☐ B ☐ C ☐ D  
 MARK AN X ON YOUR CHOICE.

## TEACHING STRATEGIES

Have students test their ideas.

EXPERIMENTATION

Now ask:

WHAT OTHER THINGS DO PEOPLE BURN OR USE TO GET ENERGY TO MAKE MACHINES WORK?

Help students to list on the chalkboard the fuels most commonly used by man. (Coal, wood, oil, gasoline, natural gas, and, if mentioned by students, atomic fuel.)

LET'S SEE HOW MANY WAYS WE CAN LIST THAT MAN USES THE ENERGY HE GETS FROM THESE FUELS. HOW ABOUT STARTING WITH (heating a house, cooking food, etc.). WHO CAN GIVE US ANOTHER USE?

Continue to elicit responses from students to develop a list of uses for each fuel.

DO YOU THINK THERE ARE ENOUGH FUELS AVAILABLE TODAY FOR MAN TO DO ALL THE WORK HE WANTS AND NEEDS TO DO?

DO YOU THINK THERE IS ENOUGH GASOLINE FOR ALL THE CARS, TRUCKS, BUSES, AIRPLANES, AND MOTORCYCLES BEING USED TODAY?

Discuss as interest warrants.

NOTE: These questions are intended to get the student to begin thinking about the finiteness of resources rather than to arrive at a definite conclusion at

## TEACHING STRATEGIES

ts test their ideas.

### EXPERIMENTATION TIME

OTHER THINGS DO PEOPLE BURN OR USE TO  
ENERGY TO MAKE MACHINES WORK?

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BEING USED TODAY?

Interest warrants.

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thinking about the finiteness of resources  
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## ANTICIPATED STUDENT BEHAVIORS

Students:

--cause wheels to turn by pushing with fingers,  
blowing, burning paper, burning other materials.

--respond, "Coal," "Wood," "Gas," "Oil," "Electri-  
city."

--respond with suggested uses for fuels, such as  
to keep warm, transportation, factories, etc.

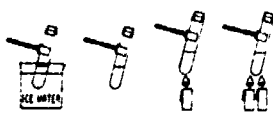
--respond, "Yes," "No," "I don't know."

--respond, "Yes," "No," "I don't know," "Maybe,"  
"Just go down to the gas station."

## MATERIALS

Date \_\_\_\_\_ Name \_\_\_\_\_

Look at the diagrams below.



1. WHICH OF THE TEST TUBES OF WATER WILL POP THE CORN THE FASTEST?  
☐ A ☐ B ☐ C ☐ D  
 MARK AN X ON YOUR CHOICE.

2. WHICH TEST TUBE OF WATER IS RECEIVING THE MOST ENERGY?  
☐ A ☐ B ☐ C ☐ D  
 MARK AN X ON YOUR CHOICE.

3. WHICH TEST TUBE OF WATER IS ABLE TO DO THE LEAST AMOUNT OF WORK?  
☐ A ☐ B ☐ C ☐ D  
 MARK AN X ON YOUR CHOICE.

Slide 3-4

## TEACHING STRATEGIES

this time. This concept of conserving non-renewable resources will be developed at a later time.

Unless the students have already concluded there is a definite shortage of fuels, ask:

DO YOU BELIEVE THAT THERE WILL BE ENOUGH OF THESE FUELS IN 10 YEARS, IN 50 YEARS, IN 100 YEARS, FOREVER? DO YOU FEEL WE WILL ALWAYS HAVE ENOUGH FUELS TO SUPPLY OUR ENERGY NEEDS?

Ask the students to give the reasons for their opinions.

At this point hand out Worksheet 3-4. Ask the students not to discuss the clues with each other, but to mark on their worksheets as you project and read the questions. Project Slide 3-4. Slowly read the instructions and ask different students to describe each of the four diagrams.

Then read the questions and provide ample time for the students to mark an "X" on their choices.

When you see that all students have made a choice, project Slide 3-5. Again draw attention to the diagrams and read the question.

ACCEPT  
ANSW

CLUES TO



## TEACHING STRATEGIES

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n.

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-5

43

Students:

--give their opinions.

  
**ACCEPT ALL  
ANSWERS**

  
**CLUES TO SUCCESS**

--inspect Diagrams A, B, C, and D and describe  
the components in each.

--mark an "X" on choice D.

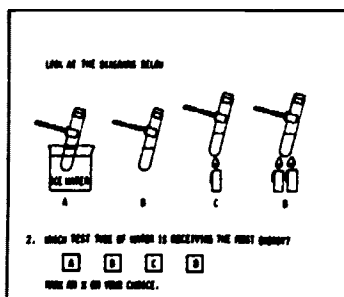
# ACTIVITY 3-5

## MATERIALS

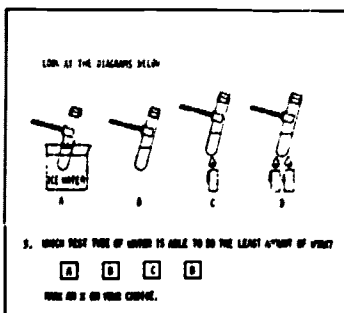
## TEACHING STRATEGIES

44

Slide 3-5



Slide 3-6



NOTE: This appears as Question 2 on Worksheet 3-4.

GIVE STUDENT  
TIME  
TO  
THINK

Project Slide 3-6. Again read the question and give the students ample time to mark a choice. This question appears as number 3 on Worksheet 3-4.

GIVE STUDENT  
TIME  
TO  
THINK

Ask the students to turn Worksheet 3-4 over. Project Slide 3-7. Read the question twice.

GIVE STUDENT  
TIME  
TO  
THINK

Then collect the worksheets.

After collecting the papers use Tallysheet 3-2 to see if any questions were missed by most of the class, if any one student missed most of the questions, or if any gross irregularities showed up in some student's answers.

If many students missed any particular question, it will most likely need to be reviewed and discussed. If one student missed many questions, he probably will need special attention in reviewing the concepts covered. If there were irregularities present which might indicate

## TEACHING STRATEGIES

appears as Question 2 on Worksheet 3-4.

**GIVE STUDENTS  
TIME  
TO  
THINK**

3-6. Again read the question and give the  
time to mark a choice. This question  
number 3 on Worksheet 3-4.

**GIVE STUDENTS  
TIME  
TO  
THINK**

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read the question twice.

**GIVE STUDENTS  
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THINK**

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need to be reviewed and discussed. If one  
many questions, he probably will need spe-  
in reviewing the concepts covered. If  
regularities present which might indicate

## ANTICIPATED STUDENT BEHAVIORS

Students:

--will mark an "X" on choice D.

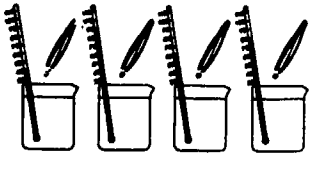
--will mark an "X" on choice A.

--will mark an "X" on the second beaker.

## MATERIALS

Slide 3-7

4. EACH BEAKER HAS THE SAME AMOUNT OF WATER. A THERMOMETER SHOWS THE TEMPERATURE OF THE WATER IN EACH BEAKER. A CRYSTAL OF PURPLE CHEMICAL IS DROPPED INTO EACH BEAKER.



IN WHICH BEAKER WILL THE PURPLE CHEMICAL SPREAD THE FASTEST?

☐ A ☐ B ☐ C ☐ D

WRITE AN X IN YOUR CHOICE.

## TEACHING STRATEGIES

illogical thinking or guessing, this might also need attention. Save the tabulation for use later on in this core.

Project each slide in turn and ask the students to discuss each.

Slide 3-4, question 1.

Slide 3-5, question 2.

Slide 3-6, question 3.

Slide 3-7, question 4.

## TEACHING STRATEGIES

inking or guessing, this might also need attention at the tabulation for use later on in this core.

slide in turn and ask the students to discuss

Question 1.

Question 2.

Question 3.

Question 4.

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-5

45

Students:

--will compare the four diagrams and note that "D" has two candles under the test tube and predict that it will pop the cork fastest.

--will equate the burning of the candles with energy release and state that two candles will supply more energy to the water.

--will infer that ice water has the least energy to release and will therefore cause test tube A to do the least work.

--will compare the four diagrams and correctly read the four thermometers, equate the highest thermometer reading (B) with the greatest amount of energy, associate energy with the ability to move a crystal, and infer that the greater the energy the more rapid the movement.

Teacher \_\_\_\_\_  
Date \_\_\_\_\_

UNIT III, CORE A  
TALLYSHEET 3-2: Tally of Worksheet 3-4  
ACTIVITY 3-5: "The Energy Wheel"

Tabulate each student's responses to the four questions on Worksheet 3-4. Performance on the first three questions should be high. Praise your students' success. Question 4 may reveal the need to review the activities in this core and the activities in Unit I, Core B, on reading a thermometer. If only a few students have been unsuccessful, provide individual help and continue with Activity 3-6.

KEY: Attach ID list here.	1 (Pop cork)				2 (Most energy)				3 (Least work)				4 (Fastest color)			
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
01	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D

Does this review give an accurate indication of student understanding?  
If not, what other evidence do you have of student learning?

Teacher \_\_\_\_\_  
Date \_\_\_\_\_

UNIT III, CORE A  
TALLYSHEET 3-2: Tally of Worksheet 3-4  
ACTIVITY 3-5: "The Energy Wheel"

Tabulate each student's responses to the four questions on Worksheet 3-4. Performance on the first three questions should be high. Praise your students' success. Question 4 may reveal the need to review the activities in this core and the activities in Unit I, Core B, on reading a thermometer. If only a few students have been unsuccessful, provide individual help and continue with Activity 3-6.

KEY: Attach ID list here.	1 (Pop cork)				2 (Most energy)				3 (Least work)				4 (Fastest color)			
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
01	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D



Does this review give an accurate indication of student understanding?  
If not, what other evidence do you have of student learning?

UNIT III, CORE A  
ACTIVITY 3-5: "The Energy Wheel"

Activity name suggested by class: \_\_\_\_\_

Teacher

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
Date taught (month and date, e.g. 11/2)						
Minutes of class time on science each day						
Minutes of preparation each day						
Students absent on each date (Use ID Number)						

BSCS USE: Post \_\_\_\_\_ Tally \_\_\_\_\_ Rev \_\_\_\_\_

1.	Date taught (month and date, e.g. 11/2)					
2.	Minutes of class time on science each day					
3.	Minutes of preparation each day					
4.	Students absent on each date (Use ID Number)					

5. Interest of class as expressed by apparent attention to what is happening.

Number of students responding with: Name students you noted especially:

	(Number)
HIGH INTEREST	_____
MODERATE INTEREST	_____
INDIFFERENCE	_____
MODERATE RESISTANCE	_____
STRONG DISLIKE	_____
HARD TO RATE	_____

6. Equipment in kit: ☐ None ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use7. Equipment I got: ☐ None ☐ Easy to get but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

Materials used:	Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:

☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless  
--keep as is revision suggested major changes described --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

Equipment got: ☐ None ☐ Easy ☐ Hard to get, ☐ Hard to get, ☐ Unobtainable,  
needed to get but okay add to kit add to kit

8. Materials used:

	Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:
10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:
11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -Pages and Problem:
12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No -Why not?
13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:
14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:
15. Your rating of this activity:  
☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless  
--keep as is revision suggested major changes described --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed.  
What parts of this activity should be retained when the curriculum is revised?  
Page(s) \_\_\_\_\_;

17. How many students could not get their pinwheel to work?  
☐ None ☐ 1/4 ☐ 1/2 ☐ 3/4 ☐ All: Explain the problem:

18. Did any student give away the answer to any question on Worksheet 3-4?  
☐ No ☐ Yes: Comment.

19. Complete Tallysheet 3-2 and send in with this feedback sheet.

20. Concern (or questions) about content:

21. Messages for staff (read immediately):

BSCS Evaluation. EMH Feedback Form 1c

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

UNIT III, CORE A  
ACTIVITY 3-5: "The Energy Wheel"

Teacher \_\_\_\_\_

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.



## Me and my Environment

### OBJECTIVE FOCUS FOR THIS ACTIVITY

#### UNIT GOALS:

1. Realize and appreciate the energy inter-relationships between organisms.

#### CORE A OBJECTIVES:

3. Recognize that the amount of and the rate at which work is done is related to the amount of energy input.
4. Conclude that energy can be stored and later released.
5. Recognize different forms of energy (heat, light, chemical, and electrical).

### MATERIALS

### TEACHING STRATEGIES

#### Activity 3-6. Chemical Energy

*In this activity the student observes that chemical energy, like any other form of energy, can be used to do work. The concept that energy does not have to be used immediately, i.e., that energy can be stored, is identified. This activity lays the groundwork for a later series of experiments which will culminate with identifying food as a source of chemical energy.*



BSCS

# UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

## CORE A. INTRODUCTION TO ENERGY

### ACTIVITY 3-6. CHEMICAL ENERGY

#### FOCUS FOR THIS ACTIVITY

##### GOALS:

1. Realize and appreciate the energy inter-relationships between organisms.

##### A OBJECTIVES:

3. Recognize that the amount of and the rate at which work is done is related to the amount of energy input.
4. Conclude that energy can be stored and later released.
5. Recognize different forms of energy (heat, light, chemical, and electrical).

#### TEACHING STRATEGIES

##### 3-6. Chemical Energy

Activity the student observes that chemical like any other form of energy, can be used to do the concept that energy does not have to be used by, i.e., that energy can be stored, is identified. This activity lays the groundwork for a later experiments which will culminate with identified as a source of chemical energy.

#### ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

- have observed and performed the Alka-Seltzer and variable liquid experiment.
- have completed Worksheet 3-5.
- be able to state that chemicals store energy.
- realize that different chemicals store different amounts of energy.
- be able to predict that Alka-Seltzer will react more vigorously as the temperature of the system increases.
- have performed the Alka-Seltzer and water temperature experiment.
- be able to equate the bubbling and movement observed in the experiment with the release of energy.

## ACTIVITY 3-6

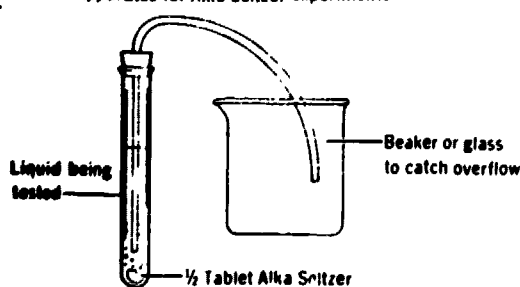
48

## MATERIALS

- \*1 Pinwheel and candle apparatus (constructed in the previous activity)
- \*Detergent solution for washing test tubes
- Per pair of students:
  - 1 Test tube (25 X 300 mm)
  - Rubber stopper (#4), one-hole
  - Plastic tubing (3/16" inside diameter, 5/16" outside diameter), 18" long
  - Beaker (400 ml)
- \*Alka-Seltzer tablets (43 tablets needed for a class of 16)
- \*Vinegar
- \*Cooking oil
- \*Tap water
- Worksheet 3-5
- Worksheet 3-6
- Slide 3-8
- Slide 3-9
- \*35mm Slide projector

Diagram 3-4

Apparatus for Alka-Seltzer experiments



\*Not furnished in materials kit

## TEACHING STRATEGIES

### Teacher Preparation:

1. Have available ice water, water at room temperature, and hot water (hot water from the tap is sufficient).
2. Set up a pinwheel and candle apparatus for demonstration purposes.
3. Before class, insert plastic tubing in rubber stoppers, enough for each two-student team. This requires a certain amount of twisting and pushing. If extreme difficulty is encountered, add a drop of mineral oil or glycerine to the hole in the stopper for lubrication. The tubing must extend through the stopper several inches so that the end is within an inch of the bottom of the tube. See Diagram 3-4.
4. This activity may take two to three days to complete. A suggested way of dividing the activity is:

-Observation of the experiment using Alka-Seltzer in various liquids.

-Data collecting on the experiment using Alka-Seltzer in various liquids.

-The experiment using Alka-Seltzer in water at various temperatures.

Begin by selecting a student to light one or more candles to start the pinwheel turning.

While student attention is focused on the burning candle and the turning wheel, say:

## TEACHING STRATEGIES

### Preparation:

Available ice water, water at room temperature, hot water (hot water from the tap is sufficient).

Obtain a pinwheel and candle apparatus for demonstration purposes.

In class, insert plastic tubing in rubber stoppers, enough for each two-student team. This requires a certain amount of twisting and pushing. If extreme difficulty is encountered, add a drop of mineral oil or glycerine to the hole in the stopper for lubrication. The tubing must extend through the stopper several inches so that the end is within 1/2 inch of the bottom of the tube. See Diagram 3-4.

The activity may take two to three days to complete.

A suggested way of dividing the activity is:

Observation of the experiment using Alka-Seltzer in various liquids.

Data collecting on the experiment using Alka-Seltzer in various liquids.

Repeating the experiment using Alka-Seltzer in water at various temperatures.

Selecting a student to light one or more candles and observe pinwheel turning.

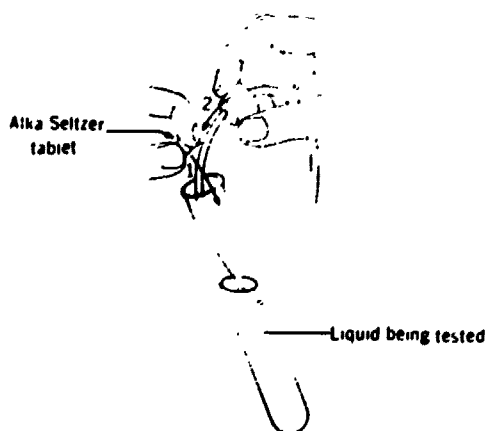
Student attention is focused on the burning candle and the pinwheel, say:

## ANTICIPATED STUDENT BEHAVIORS



## MATERIALS

Diagram 3-5



Technique diagram for Alka-Seltzer experiment

## TEACHING STRATEGIES

THIS MACHINE THAT WE BUILT HAS SHOWN US THAT BY BURNING WE CAN RELEASE THE ENERGY STORED IN THE CANDLE. NOW WE ARE GOING TO DO SOME MORE EXPERIMENTS WHERE WE RELEASE STORED ENERGY FROM A CHEMICAL.

Begin this experiment by distributing the materials listed and Worksheet 3-5 to each pair of students.



DISTRIBUTE

### An experiment using Alka-Seltzer in various liquids

Tell the students that they will be testing to see what happens when Alka-Seltzer is dropped into different liquids. Tell the students that they will be experimenting twice -- the first time simply to observe what is happening; the second time to observe and record the results.

Direct the students to use the following sequence for each test. Do the cooking oil test last.

1. Make a mark, using masking tape, 6" from the bottom of the test tube to indicate how much liquid is to be used.
2. Fill a large test tube to the tape mark for each testing liquid.
3. 1st test - water  
2nd test - alcohol  
3rd test - vinegar  
4th test - cooking oil

NOTE: All of these liquids should be at room temperature.

## TEACHING STRATEGIES

MACHINE THAT WE BUILT HAS SHOWN US THAT BY  
G WE CAN RELEASE THE ENERGY STORED IN THE  
. NOW WE ARE GOING TO DO SOME MORE EXPERI-  
WHERE WE RELEASE STORED ENERGY FROM A  
AL.

experiment by distributing the materials listed  
et 3-5 to each pair of students.



DISTRIBUTE MATERIALS

ent using Alka-Seltzer in various liquids

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n Alka-Seltzer is dropped into different  
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a mark, using masking tape, 6" from the  
m of the test tube to indicate how much  
d is to be used.

a large test tube to the tape mark for  
testing liquid.

est - water  
est - alcohol  
est - vinegar  
etc - cooking oil

All of these liquids should be at room  
temperature.

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-6

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# ACTIVITY 3-6

50

## MATERIALS

Date \_\_\_\_\_ Name \_\_\_\_\_

Alka-Seltzer - Liquid Experiment		
Test	Liquid used	Speed of reaction
		(see rating scale)
1	Water	
2	Bubbling alcohol	
3	Vinegar	
4	Cooking oil	

Speed of reaction scale	
None	= 0
Slow	= +
Fast	= ++
Really fast	= +++

Slide 3-8

Worksheet 3-5

## TEACHING STRATEGIES

4. Insert the plastic tubing into the test tube but do not completely stopper the tube. Leave the tube open enough to drop in the Alka-Seltzer. See Diagram 3-5. The free end of the plastic tubing should be placed in a beaker or other suitable container to catch any overflow. See Diagram 3-4.
5. Drop in the Alka-Seltzer. (Use one-half tablet for each test.)
6. Quickly and tightly stopper the tube and observe what happens.
7. Rinse the tube after each test. Following the cooking oil test, the tubes will have to be washed with detergent solution.



Allow students to perform and observe the four tests. After carefully cleaning the oil from the test tube, have the students repeat each test. Upon repeating the experiment, however, have the students rate the energy released on the worksheet. They do this by indicating the speed of bubbling and how fast the liquid is emptied, using the scale at the bottom of the worksheet. Project Slide 3-8 of Worksheet 3-5, pointing out where and how the data are recorded as well as how to use the scale.



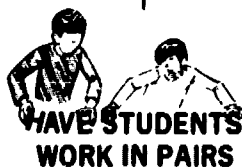
## TEACHING STRATEGIES

the plastic tubing into the test tube but do not completely stopper the tube. Leave the tube loose enough to drop in the Alka-Seltzer. See Diagram 3-5. The free end of the plastic tubing should be placed in a beaker or other suitable container to catch any overflow. See Diagram 3-4.

Drop the Alka-Seltzer. (Use one-half tablet for each test.)

Seal the tube and tightly stopper the tube and observe what happens.

Remove the tube after each test. Following the oil test, the tubes will have to be washed with detergent solution.



Students are to perform and observe the four tests. After thoroughly cleaning the oil from the test tube, have students repeat each test. Upon repeating the experiment, have the students rate the energy released in each test. They do this by indicating the speed of the reaction, how fast the liquid is emptied, using the bottom of the worksheet. Project Slide 3-8 and 3-5, pointing out where and how the data are recorded as well as how to use the scale.

## ANTICIPATED STUDENT BEHAVIORS

Students:

--perform experiments and record observations.



## MATERIALS

## TEACHING STRATEGIES

After completion of all tests, again project Slide 3-8. For each liquid, ask for a count of how many students used each rating and put a number under that rating on the transparency.

Ask:

WHY DIDN'T ALL OF YOU GET THE SAME RATINGS?

WHICH OF THE LIQUIDS IN THE TEST TUBES HELPED TO RELEASE THE STORED ENERGY IN THE ALKA-SELTZER?

HOW COULD YOU TELL?

WHICH LIQUID HELPED RELEASE THE STORED ENERGY THE FASTEST?

WHICH LIQUID WAS SECOND FASTEST?

Hold up half an Alka-Seltzer tablet and ask:

WHERE WAS THE ENERGY BEFORE YOU ADDED THIS CHEMICAL TO THE LIQUIDS?

WE'VE SEEN THAT CHEMICAL ENERGY CAN BE STORED IN THE ALKA-SELTZER TABLET. CAN ENERGY BE STORED IN ANYTHING ELSE?

If the students do not contribute these or similar examples, discuss with them how unburned material or a battery will do work (release energy) when activated or started.

## TEACHING STRATEGIES

ation of all tests, again project Slide 3-8.  
 quid, ask for a count of how many students used  
 and put a number under that rating on the

ON'T ALL OF YOU GET THE SAME RATINGS?

OF THE LIQUIDS IN THE TEST TUBES HELPED  
 ASE THE STORED ENERGY IN THE ALKA-SELTZER?

LD YOU TELL?

LIQUID HELPED RELEASE THE STORED ENERGY  
 TEST?

LIQUID WAS SECOND FASTEST?

an Alka-Seltzer tablet and ask:

AS THE ENERGY BEFORE YOU ADDED THIS  
 L TO THE LIQUIDS?

EEEN THAT CHEMICAL ENERGY CAN BE STORED  
 ALKA-SELTZER TABLET. CAN ENERGY BE  
 IN ANYTHING ELSE?

the students do not contribute these or  
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 urning material or a battery will do  
 k ase energy) when activated or

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-6

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Students:

--suggest, "The Alka-Seltzer was crumbled,"  
 "Weren't watching closely," "Didn't know what  
 the rating meant," "We didn't use exactly  
 1/2 of a tablet each time."

--inspect their data and respond that all did.

--associate the amount of bubbling and emptying  
 of the test tube with energy release.

--reply, "Vinegar."

--respond, "Water."

--infer the energy was stored in the chemical,  
 Alka-Seltzer.

--recall the burning candle or offer other examples  
 such as wood, gas, paper before it burns, a  
 battery before it is used.

# ACTIVITY 3-6

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## MATERIALS

Date \_\_\_\_\_ Name \_\_\_\_\_

Alka-Seltzer - Temperature Experiment

Test	Temperature of water	Predictions	Actual results
1	Boil water		
2	Tap water		
3	Hot water		

Speed of reaction scale

None = 0  
 Slow = +  
 Fast = ++  
 Really fast = +++

Slide 3-9

Worksheet 3-6

## TEACHING STRATEGIES

Now ask:

WHAT COULD YOU DO TO THE WATER/ALKA-SELTZER TEST TUBE TO MAKE IT GIVE OFF ENERGY AS FAST AS THE VINEGAR/ALKA-SELTZER TEST TUBE?

Allow the students time to test suggestions they make in response to the above question. After allowing time to think, manipulate, experiment, and discuss results, begin the second experiment.



An experiment using Alka-Seltzer in water at various temperatures.

Begin the experiment by handing out Worksheet 3-6.

Say:

WE ARE GOING TO DO ANOTHER EXPERIMENT USING ALKA-SELTZER. BUT FIRST LET'S TALK ABOUT WHAT MIGHT HAPPEN. WE ARE GOING TO TRY THREE TESTS.

Project Slide 3-9 of Worksheet 3-6.

Read over the worksheet together with the students, discussing what each column is for and what information belongs there. Have water ready as indicated in the teacher preparation instructions.

## TEACHING STRATEGIES

WOULD YOU DO TO THE WATER/ALKA-SELTZER  
TO MAKE IT GIVE OFF ENERGY AS FAST  
VINEGAR/ALKA-SELTZER TEST TUBE?

Students time to test suggestions they make in  
the above question. After allowing time to  
plate, experiment, and discuss results, begin  
experiment.

using Alka-Seltzer in water at various

experiment by handing out Worksheet 3-6.

GOING TO DO ANOTHER EXPERIMENT USING  
SELTZER. BUT FIRST LET'S TALK ABOUT  
WHAT HAPPEN. WE ARE GOING TO TRY THREE

3-9 of Worksheet 3-6.

Worksheet together with the students, dis-  
cuss each column is for and what information  
Have water ready as indicated in the  
direction instructions.

## ANTICIPATED STUDENT BEHAVIORS

Students:

--suggest one of the three methods:

1. add more Alka-Seltzer,
2. add vinegar, or
3. heat the water.





## MATERIALS

## TEACHING STRATEGIES

Ask:

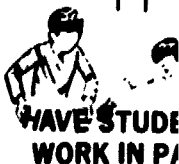
WHAT DO YOU THINK WILL HAPPEN IF WE PUT THE ALKA-SELTZER IN THESE LIQUIDS?

Refer to Slide 3-9. Remind the students of the rating scale they used in the previous experiment.

Then ask:

WHICH OF THESE THREE TESTS WILL RELEASE ENERGY THE FASTEST?

ON YOUR WORKSHEET MAKE YOUR PREDICTIONS OF HOW FAST THE ENERGY WILL BE RELEASED BY MARKING 0, +, ++, OR +++ BY EACH TEST.



Be sure each student has made the three predictions. Now allow students to perform the tests. After the experiment, be sure each student has recorded his own judgment of reaction speed in each test, using the scale provided.

## TEACHING STRATEGIES

DO YOU THINK WILL HAPPEN IF WE PUT THE  
ELTZER IN THESE LIQUIDS?

ide 3-9. Remind the students of the rating  
used in the previous experiment.

OF THESE THREE TESTS WILL RELEASE ENERGY  
TEST?

R WORKSHEET MAKE YOUR PREDICTIONS OF HOW  
HE ENERGY WILL BE RELEASED BY MARKING 0,  
OR +++ BY EACH TEST.

n student has made the three predictions. Now  
ats to perform the tests. After the experiment,  
a student has recorded his own judgment of  
ed in each test, using the scale provided.

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-6

53

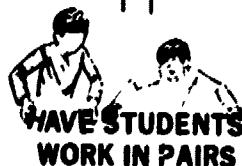
Students:

--relate heat to energy and make various  
predictions about the effects of different  
temperatures of water on Alka-Seltzer.

--make various predictions.

--rate the predicted results according to the  
rating scale on Worksheet 3-5.

--conduct experiments; each rates the three tests,  
using the scale provided.



ACTIVITY 3-6

54

MATERIALS

TEACHING STRATEGIES



Now project Slide 3-9 again and for each test ask:

WHAT WERE THE RESULTS OF THE EXPERIMENT?

HOW MANY RATED THIS TEST 0? \_\_\_\_ +? \_\_\_\_ ++? \_\_\_\_  
+++? \_\_\_\_

Write the agreed upon ratings on the projected image of the worksheet.

If ratings are not readily agreed upon, have the students suggest why differences occurred.

NOTE: It is important to agree upon the relative order of the action of the water temperatures, rather than a specific rating. If everything was performed correctly (i.e., the only variable each time was the temperature), the hotter the water, the more vigorous the reaction.

For each test ask:

DID ANYONE PREDICT WHAT HAPPENED ON THIS TEST?

Recognize and praise all who did.

WHAT THINGS CAUSED A LOT OF MOVEMENT?

WHAT DOES THE BUBBLING SHOW?

## TEACHING STRATEGIES

Slide 3-9 again and for each test ask:

ARE THE RESULTS OF THE EXPERIMENT?

RATED THIS TEST 0? \_\_\_\_ +? \_\_\_\_ ++? \_\_\_\_

eed upon ratings on the projected image of  
t.

e not readily agreed upon, have the students  
ifferences occurred.

important to agree upon the relative order of  
tion of the water temperatures, rather than a  
ic rating. If everything was performed cor-  
(i.e., the only variable each time was the  
ature), the hotter the water, the more  
us the reaction.

ask:

NE PREDICT WHAT HAPPENED ON THIS TEST?

praise all who did.

INGS CAUSED A LOT OF MOVEMENT?

THE BUBBLING SHOW?

## ANTICIPATED STUDENT BEHAVIORS

Students:



--indicate how they rated each test.

--suggest that it is necessary to compare the  
four tests; one test caused little or no  
bubbling and movement of fluid through the  
tube compared to another that caused a lot.

--compare their predicted and actual ratings.

--respond, "Hot water."

--infer, "Energy is being given off."

## MATERIALS

## TEACHING STRATEGIES

WHERE WAS THE ENERGY BEFORE THE ALKA-SELTZER WAS PUT INTO THE LIQUIDS?

DID YOU GET THE SAME RESULTS IN ALL THE TEST TUBES?

WHY NOT?

The following instructions will give you a basis for tabulating the responses of your students to this last experiment.

Directions for interpreting Worksheet 3-5 - the Alka-Seltzer and water temperature experiment.

First, tally each student's prediction and reported results. Then total the number of students who predicted 0, +, ++, +++ for their predicted and actual results. This will give you a picture of the number of students that predicted each rating and what they observed. You will see from looking at this tally whether there is consistency in the class in making predictions or observations.

Now look at the three predictions each student made and classify whether his predictions are logical or illogical. If the predictions are in a reverse order (i.e., if a student predicted + for ice water, ++ for tap water, and 0 for hot water), they are illogical. When you have rated each student's paper in terms of logical predictions, you can make a judgment about whether more time should be spent on what to think about when you make predictions, or on explaining why certain predictions are made.

## TEACHING STRATEGIES

WAS THE ENERGY BEFORE THE ALKA-SELTZER  
PUT INTO THE LIQUIDS?

DO YOU GET THE SAME RESULTS IN ALL THE TESTS?

NOT?

Following instructions will give you a basis for  
the responses of your students to this last

for interpreting Worksheet 3-5 - the Alka-  
water temperature experiment.

By each student's prediction and reported  
then total the number of students who predicted  
++ for their predicted and actual results.  
Give you a picture of the number of students  
rated each rating and what they observed. You  
can look at this tally whether there is  
in the class in making predictions or obser-

the three predictions each student made and  
whether his predictions are logical or illogical.  
Predictions are in a reverse order (i.e., if a  
predicted + for ice water, ++ for tap water, and  
water), they are illogical. When you have  
student's paper in terms of logical predictions,  
make a judgment about whether more time should be  
spent to think about when you make predictions,  
explaining why certain predictions are made.

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-6

55

Students:

--infer that chemicals such as Alka-Seltzer  
store energy or have energy in them.

--respond, "No."

--recall that different temperatures release  
energy at different rates and infer that  
increased temperature will cause the Alka-  
Seltzer to release its energy faster.

**ACTIVITY 3-6****56****MATERIALS****TEACHING STRATEGIES**

Now look at the three results each student reported for the different water temperatures. These observations are reasonable if they observed an increase in rate of activity across water temperature. For example, a reasonable result would be ice water 0, tap water +, hot water ++, or ice water +, tap water ++, hot water +++. These observed results would be unreasonable if more activity is associated with colder water. You must also watch for the number of responses where there is no change between what a student predicts and what he observes. Students may have been very accurate in predicting, but they may simply be repeating their predictions rather than responding to what they saw. You can use this information to decide whether further discussion is necessary, or if repetition of the activity is needed.

## TEACHING STRATEGIES

the three results each student reported for  
at water temperatures. These observations are  
if they observed an increase in rate of acti-  
water temperature. For example, a reasonable  
be ice water 0, tap water +, hot water ++,  
+, tap water ++, hot water +++. These  
sults would be unreasonable if more activity  
ed with colder water. You must also watch  
per of responses where there is no change  
a student predicts and what he observes.  
y have been very accurate in predicting, but  
ply be repeating their predictions rather than  
to what they saw. You can use this information  
whether further discussion is necessary, or if  
of the activity is needed.

## ANTICIPATED STUDENT BEHAVIORS



Date .

ACTIVITY 3-6: "Chemical Energy"

Column 2: Look at the three predictions each student made and check whether they are logical or illogical. A logical response would show a progression of increasing activity with increasing temperature. The response is illogical if more activity is predicted for a lower temperature than a higher one (e.g., + for ice water, 0 for tap water, and +++ for hot water). If many students have made illogical predictions, time should be spent on what to think about when you make predictions and explanations should be given of why certain predictions are made.

[illegible]

**TOTALS:**



[illegible]

UNIT III, CORE A  
ACTIVITY 3-6: "Chemical Energy"

Activity name suggested by class:

Teacher	
BSCS USE:	Post Tally Rev
Day 1	Day 2
Day 3	Day 4
Day 5	Day 6

1.	Date taught (month and date, e.g. 11/2)					
2.	Minutes of class time on science each day					
3.	Minutes of preparation each day					
4.	Students absent on each date (Use ID Number)					

5. Interest of class as expressed by apparent attention to what is happening.Number of students responding with: Name students you noted especially:  
(Number)

HIGH INTEREST	_____
MODERATE INTEREST	_____
INDIFFERENCE	_____
MODERATE RESISTANCE	_____
STRONG DISLIKE	_____
HARD TO RATE	_____

6. Equipment in kit: ☐ None ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use7. Equipment I got: ☐ None ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:	Worksheet #	Game #	Slides (show slide ncs.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: Omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:

☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless  
--keep as is revision suggested major changes described --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

Worksheet #	Game #	Slides (show slide ncs.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is						
Revise slightly						
Revise much						
Worthless: omit						

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:
10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:
11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:
12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?
13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:
14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:
15. Your rating of this activity:  
☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless  
--keep as is revision suggested major changes described --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed.  
What parts of this activity should be retained when the curriculum is revised?  
Page(s) \_\_\_\_\_

17. On the chart below show the number of students making each rating on Worksheet 3-5.  
(You did this on Slide 3-8 in class.)

Alka-Seltzer - Liquid Experiment

	0	+	++	+++
1. Water				
2. Rubbing Alcohol				
3. Vinegar				
4. Cooking Oil				

18. Complete Tallysheet 3-3 analyzing the results students reported on Worksheet 3-6 and send in with this feedback sheet.
19. Concern (or questions) about content:
20. Messages for staff (read immediately):

UNIT III, CORE A  
ACTIVITY 3-6: "Chemical Energy"

Teacher \_\_\_\_\_

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON.

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.



## Me and my Environment

### OBJECTIVE FOCUS FOR THIS ACTIVITY

#### UNIT GOALS:

1. Realize and appreciate the energy inter-relationships between organisms.

#### CORE A OBJECTIVES:

2. Recognize that the ability to move or cause movement requires energy.
3. Recognize that the amount of and the rate at which work is done is related to the amount of energy input.
4. Conclude that energy can be stored and later released.

### MATERIALS

Slide 3-10  
Slide 3-11  
Slide 3-12

(Continued on next page)

### TEACHING STRATEGIES

#### Activity 3-7. How Tall Is J. Oscar Hooperstraat

*A graph is one of the more common means of communication among scientists. It is becoming increasingly important as an everyday means of communication, a fact that can be confirmed by picking up any newspaper or magazine. This activity introduces the student to the basic skills of line graph construction and interpretation.*

Begin this activity by saying:

SCIENTISTS, WHEN CONDUCTING EXPERIMENTS, MAKE RECORDS OF THINGS THEY SEE HAPPENING. THEY HAVE A SPECIAL WAY OF PRESENTING THIS INFORMATION FOR OTHERS TO READ AND SEE.





**BSCS**

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE A. INTRODUCTION TO ENERGY

ACTIVITY 3-7. HOW TALL IS J. OSCAR HOOPERSTRAAT

FOCUS FOR THIS ACTIVITY

GOALS:

1. Realize and appreciate the energy inter-relationships between organisms.

A OBJECTIVES:

2. Recognize that the ability to move or cause movement requires energy.
3. Recognize that the amount of and the rate at which work is done is related to the amount of energy input.
4. Conclude that energy can be stored and later released.

**TEACHING STRATEGIES**

-7. How Tall Is J. Oscar Hooperstraat

one of the more common means of communication artists. It is becoming increasingly important in our everyday means of communication, a fact that can be illustrated by picking up any newspaper or magazine. This activity introduces the student to the basic skills of graph construction and interpretation.

activity by saying:

SCIENTISTS, WHEN CONDUCTING EXPERIMENTS, MAKE RECORDS OF THINGS THEY SEE HAPPENING. THEY USE A SPECIAL WAY OF PRESENTING THIS INFORMATION FOR OTHERS TO READ AND SEE.

**ANTICIPATED STUDENT BEHAVIORS**

At the end of this activity, each student should:

- have had practice in locating data from the age/height graph and the student absence graph.
- be able to extrapolate to find points not actually plotted on a graph.
- be able to locate the intersection of two lines on a graph and state what that intersection represents.
- have participated in the construction of the rat graph.

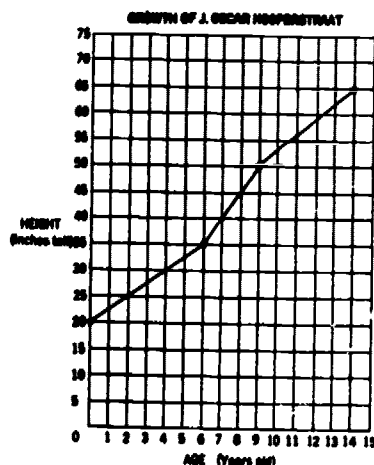
# ACTIVITY 3-7

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## MATERIALS

\*35mm Slide projector  
Worksheet 3-7  
Slides 3-13 through 3-16

Slide 3-10



## TEACHING STRATEGIES

Project Slide 3-10 and say:

HERE IS AN EXAMPLE OF WHAT I AM TALKING ABOUT. THIS IS A DIAGRAM SIMILAR TO WHAT SCIENTISTS OFTEN USE. DOES ANYONE KNOW WHAT WE CALL THIS KIND OF DIAGRAM?

If the term graph is not elicited, say:

THIS DIAGRAM IS CALLED A GRAPH. A GRAPH SHOWS US SOMETHING WITHOUT WRITING IT OUT IN WORDS.

Point to the slide and ask:

CAN ANYBODY FIGURE OUT WHAT THIS GRAPH TELLS US?

NOTE: Because of their backgrounds, some students may be able to read the graph. The majority of the students will probably not be able to comment.

Proceed on the assumption that the majority of the students will need instruction on graph construction and reading a graph.

Refer again to the projected graph, read the title, and ask:

WHAT DOES THE TITLE OF THE GRAPH TELL YOU?

WHAT DO THE NUMBERS ON THE SIDE OF THE GRAPH TELL US?

\*Not furnished in materials kit

## TEACHING STRATEGIES

3-10 and say:

AN EXAMPLE OF WHAT I AM TALKING ABOUT.  
A DIAGRAM SIMILAR TO WHAT SCIENTISTS  
USE. DOES ANYONE KNOW WHAT WE CALL THIS  
DIAGRAM?

the term graph is not elicited, say:

THIS DIAGRAM IS CALLED A GRAPH. A GRAPH  
SHOWS US SOMETHING WITHOUT WRITING IT OUT  
IN WORDS.

slide and ask:

EVERYBODY FIGURE OUT WHAT THIS GRAPH TELLS

Because of their backgrounds, some students may  
be able to read the graph. The majority of the  
students will probably not be able to comment.

Make the assumption that the majority of the students  
need instruction on graph construction and reading a

Look at the projected graph, read the title, and

WHAT DOES THE TITLE OF THE GRAPH TELL YOU?

WHAT DO THE NUMBERS ON THE SIDE OF THE GRAPH

## ANTICIPATED STUDENT BEHAVIORS

Students:

--respond with such things as, "A picture," "Lines,"  
etc. Few if any students will likely be able to  
recognize or identify the diagram as a graph.

--respond with "Tells the age," "Tells how tall  
he is," "Tells us how old," "Tells us something."

--respond, "He's growing," "How he grows," "It's  
about J. Oscar Hooperstraat."

--study the graph and state, "How old he is."

## MATERIALS

## TEACHING STRATEGIES

THE NUMBERS STAND FOR EACH YEAR IN THE LIFE OF J. OSCAR.

WHAT DO THE NUMBERS ALONG THE BOTTOM STAND FOR?

THE NUMBERS ON THE BOTTOM LINE TELL US HOW MANY INCHES TALL J. OSCAR IS.

CAN SOMEONE POINT TO THE PLACE ON THE GRAPH THAT TELLS US WHEN J. OSCAR WAS BORN?

If students have difficulty determining this, ask:

HOW MANY YEARS OLD IS A PERSON WHO WAS JUST BORN?

WHERE IS ZERO YEARS (or no years) ON THE GRAPH?

CAN SOMEONE SHOW US HOW TO FIND OUT HOW TALL J. OSCAR WAS WHEN HE WAS BORN?

If students do not know how to find a point on the graph, instruct the class on the procedure to do this. Tell them to put one finger on an age and follow that age line across until it intersects the graph line. At that point follow the vertical line down with a finger until it stops at an inches mark.



## TEACHING STRATEGIES

NUMBERS STAND FOR EACH YEAR IN THE LIFE  
J. OSCAR.

DO THE NUMBERS ALONG THE BOTTOM STAND

NUMBERS ON THE BOTTOM LINE TELL US HOW  
INCHES TALL J. OSCAR IS.

SOMEONE POINT TO THE PLACE ON THE GRAPH  
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SOMEONE SHOW US HOW TO FIND OUT HOW TALL  
OSCAR WAS WHEN HE WAS BORN?

Students do not know how to find a point on the graph,  
tell the class on the procedure to do this. Tell  
out one finger on an age and follow that age  
across until it intersects the graph line. At that  
follow the vertical line down with a finger until it  
reaches an inches mark.

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-7

59

Students:

--study the graph and state, "How many inches  
he is," "How tall he is."

--locate the "0."

--state, "No years," "0 years."

--locate and point to the "0" on the graph.

--attempt to put a finger on 0, follow across  
the axis line until it intersects the graph  
line, and reply 20 inches.

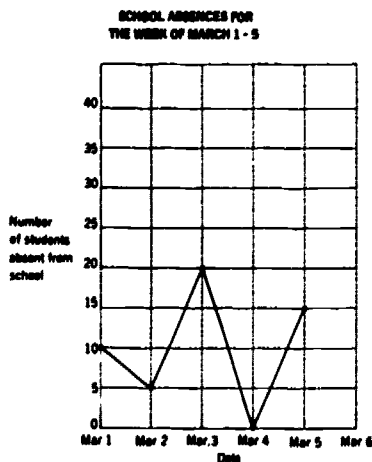
--practice interpreting the data on the age graph.



# ACTIVITY 3-7

60

## MATERIALS



Slide 3-11

## TEACHING STRATEGIES

Ask:

CAN ANYONE TELL US, BY LOOKING AT THE GRAPH,  
HOW TALL J. OSCAR WAS AT SIX YEARS?

Repeat question above for nine years and fourteen years. Be sure that the same students are not always answering the questions. Try to include as many students as possible in the discussion and questioning procedure since this is an instructive exercise and each student will need this information in later activities. Asking questions such as, "JOE, DO YOU THINK HE'S RIGHT?" or "WHAT DO YOU THINK THE ANSWER IS?", "DO YOU AGREE WITH THAT ANSWER?", sometimes helps to include students.

Continue by saying:

THE PERSON WHO MADE THIS GRAPH DID NOT HAVE THE INFORMATION FOR HOW TALL J. OSCAR WAS AT EIGHT YEARS OF AGE. BY LOOKING AT THE GRAPH, CAN ANYBODY FIGURE OUT HOW TALL HE PROBABLY WAS AT EIGHT YEARS?

Project Slide 3-11.

Say:

HERE IS ANOTHER GRAPH. LET'S SEE IF WE CAN UNDERSTAND WHAT THE GRAPH IS ABOUT.

To assist students in their interpretations, ask the following questions:

WHAT DOES THE TITLE TELL US?

## TEACHING STRATEGIES

YONE TELL US, BY LOOKING AT THE GRAPH,  
LL J. OSCAR WAS AT SIX YEARS?

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O YOU THINK HE'S RIGHT?" or "WHAT DO YOU THINK  
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to include students.

saying:

SON WHO MADE THIS GRAPH DID NOT HAVE THE  
TION FOR HOW TALL J. OSCAR WAS AT EIGHT  
F AGE. BY LOOKING AT THE GRAPH, CAN  
FIGURE OUT HOW TALL HE PROBABLY WAS AT  
YEARS?

e 3-11.

ANOTHER GRAPH. LET'S SEE IF WE CAN  
AND WHAT THE GRAPH IS ABOUT.

udents in their interpretations, ask the  
estions:

ES THE TITLE TELL US?

## ANTICIPATED STUDENT BEHAVIORS

Students:

--come to graph, interpret graph, and reply  
thirty-five inches.

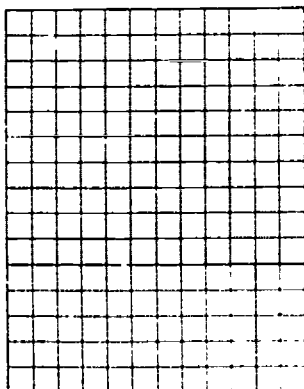
--utilize the information on how to use graph,  
extrapolate, and reply, "Forty-five inches."

--read the title (or listen while it is read to them)  
and respond, "How many kids are gone," "How many  
kids are sick."

## MATERIALS

Year	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954
Rate	75	25	25	50	150	75	50	125	150	100

RATS IN ONE CITY BLOCK OF N.Y. CITY



Slide 3-12

## TEACHING STRATEGIES

WHAT DO THE NUMBERS ON THE SIDE OF THE GRAPH TELL US?

WHAT DO THE NUMBERS ON THE BOTTOM OF THE GRAPH TELL US?

ON MARCH 1 HOW MANY STUDENTS WERE ABSENT?

ON MARCH 4 HOW MANY STUDENTS WERE ABSENT?

ON MARCH 5 HOW MANY STUDENTS WERE ABSENT?

THE PERSON WHO MADE THE GRAPH HAD INFORMATION FOR ONLY ONE WEEK. BUT THE NEXT MONDAY, MARCH 8, HE FOUND OUT THAT FIVE STUDENTS WERE ABSENT. IF WE WANTED TO PUT THAT INFORMATION ON THE GRAPH WHERE WOULD WE PUT THE DOT?

Project Slide 3-12.

Say:

HERE IS A BLANK GRAPH AND ABOVE IT IS SOME INFORMATION. LET'S SEE IF WE CAN PUT THIS INFORMATION ON A GRAPH SO IT WOULD BE EASIER TO READ.

GIVE STUDENTS  
TIME  
TO  
THINK



## TEACHING STRATEGIES

THE NUMBERS ON THE SIDE OF THE GRAPH  
S?

THE NUMBERS ON THE BOTTOM OF THE GRAPH  
S?

CH 1 HOW MANY STUDENTS WERE ABSENT?

CH 4 HOW MANY STUDENTS WERE ABSENT?

CH 5 HOW MANY STUDENTS WERE ABSENT?

PERSON WHO MADE THE GRAPH HAD INFORMATION  
Y ONE WEEK. BUT THE NEXT MONDAY, MARCH  
FOUND OUT THAT FIVE STUDENTS WERE ABSENT.  
WANTED TO PUT THAT INFORMATION ON THE  
WHERE WOULD WE PUT THE DOT?

e 3-12.

A BLANK GRAPH AND ABOVE IT IS SOME  
TION. LET'S SEE IF WE CAN PUT THIS  
TION ON A GRAPH SO IT WOULD BE EASIER

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-7

61

Students:

--read side of graph and respond, "Number of  
students absent."

--read bottom of graph and respond, "Days in March."

--find the intersection of the number and date lines  
and reply, "Ten."

--reply, "Zero," "None."

GIVE STUDENTS  
TIME  
TO  
THINK



--reply, "Fifteen."

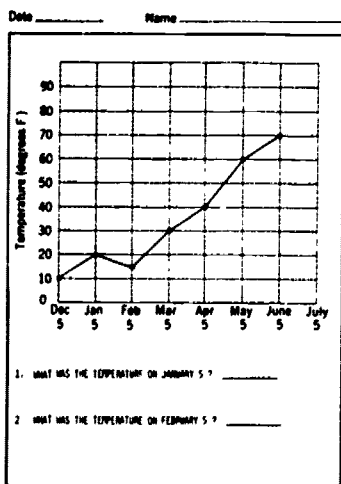
--respond by pointing to (5, 8) place on graph and  
connect the line.

# ACTIVITY 3-7

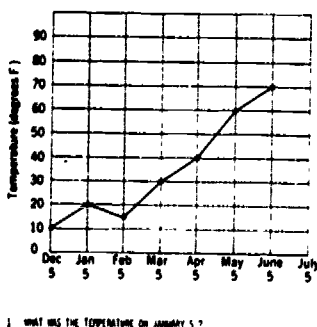
62

## MATERIALS

### Worksheet 3-7



### Slide 3-13



## TEACHING STRATEGIES

Read data with students so each student understands what is to be graphed, always allowing the students to do the labeling and plotting, and again make sure to include all students in this strategy. Follow the instructions below for constructing the rat graph:

1. Since graphing conventions suggest the time variable be along the bottom axis, direct students to label this axis with the years. This can best be accomplished by telling the students where the dates should be placed and then having one or more volunteers go to the board and label the graph.
2. Repeat this procedure for labeling the vertical, or side, axis with number of rats.
3. Asking different students each time to do the plotting on the board, assist students in plotting points representing the rat data.
4. Direct a student to connect the dots, making a line.

## TEACHING STRATEGIES

th students so each student understands what  
phed, always allowing the students to do the  
plotting, and again make sure to include all  
this strategy. Follow the instructions below  
ting the rat graph:

graphing conventions suggest the time variable  
ng the bottom axis, direct students to label  
axis with the years. This can best be accom-  
d by telling the students where the dates  
be placed and then having one or more volun-  
go to the board and label the graph.

this procedure for labeling the vertical,  
e, axis with number of rats.

different students each time to do the  
ng on the board, assist students in plotting  
representing the rat data.

a student to connect the dots, making a line.

## ANTICIPATED STUDENT BEHAVIORS

Students:

--starting with the first vertical, should label the  
bottom axis of graph on the chalkboard, using 1945  
as the first number, with each line thereafter  
representing the next consecutive year.

--label the vertical, or side, axis of the graph on  
the board to look something like this:

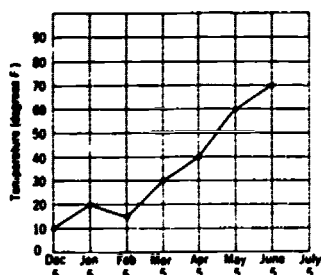
	200
	175
No. of	150
rats in	125
one city	100
block	75
	50
	25
	0

--plot points on graph by placing a dot on the right  
place on the map.

--connect dots.

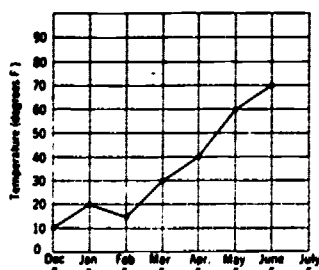
## MATERIALS

Slide 3-14



2. WHAT WAS THE TEMPERATURE ON FEBRUARY 5? \_\_\_\_\_

Slide 3-15

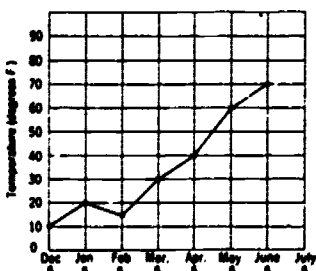


3. COMPARE THE TEMPERATURES FROM JANUARY 5 TO JUNE 5. WHICH SENTENCE BELOW BEST TELLS WHAT HAPPENED TO THE TEMPERATURE?

☐ IT WENT UP. ☐ IT WENT DOWN. ☐ IT STAYED THE SAME.

MAKE AN X ON YOUR CHOICE

Slide 3-16



4. THE TEMPERATURE ON JULY 5 WAS 80°. PLACE A DOT ON THE GRAPH TO SHOW THAT TEMPERATURE.

## TEACHING STRATEGIES



Distribute Worksheet 3-7. Project each of the four questions, Slides 3-13 through 3-16, separately. In each case read the question aloud and pause long enough for the students to study and then mark their answer choices.



Collect the worksheets and then project each slide once again. Give a variety of students the opportunity to go to the chalkboard and point out and explain the reasoning behind their answers for each of the questions. After class tally the student's responses on Tallysheet 3-4, which you will find on the following page.

Conclude by saying:

WE HAVE SEEN HOW SCIENTISTS GRAPH INFORMATION, WE HAVE LEARNED HOW TO READ THE INFORMATION GIVEN ON A GRAPH, AND FINALLY WE HAVE MADE OUR OWN GRAPHS.

IN THE NEXT ACTIVITY YOU WILL AGAIN BE GRAPHING SOME INFORMATION YOU WILL COLLECT WHILE DOING AN EXPERIMENT.



## TEACHING STRATEGIES

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-7

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Worksheet 3-7. Project each of the four questions 3-13 through 3-16, separately. In each case read the question aloud and pause long enough for the students to study and then mark their answer choices.



the worksheets and then project each slide once to give a variety of students the opportunity to go to the chalkboard and point out and explain the reasoning for their answers for each of the questions. After projecting the student's responses on Tallysheet 3-4, they will find on the following page.

by saying:

WE HAVE SEEN HOW SCIENTISTS GRAPH INFORMATION, WE HAVE LEARNED HOW TO READ THE INFORMATION ON A GRAPH, AND FINALLY WE HAVE MADE OUR OWN GRAPHS.

IN THE NEXT ACTIVITY YOU WILL AGAIN BE GRAPHING INFORMATION YOU WILL COLLECT WHILE DOING AN EXPERIMENT.



Teacher \_\_\_\_\_  
Date \_\_\_\_\_

UNIT III, CORE A

TALLY SHEET 3-4: Tally of Worksheet 3-7 and 3-8

ACTIVITY 3-7: "How Tall Is J. Oscar Hooperstaat"

ACTIVITY 3-8: "The High Flyer"

Tally each student's responses to the four questions in the columns below.

Column 1. Question 1. 20° is the correct answer for January 5. Check the 20° column or write in any other temperature given. Most students should be successful on this question if they have understood this activity. Review or provide further practice as indicated.

Column 2. Question 2. The correct answer, 15° on February 5, requires the student to interpolate as only 10° and 20° are shown. Some students may have difficulty answering this item. Use it for instruction, but do not expect mastery by all students.

Column 3. Question 3. The correct answer is "It went up," the third choice. Check the column showing each student's response. This item will help you learn how many of your students can see a pattern in graphed data, which is the subject of instruction in the next activity.

Column 4. Question 4. Check the appropriate column to show a correct entry of 90° on July 5 or an X on the wrong date or temperature. Mark both if neither is correct. As each student is expected to construct a graph in the next activity, further practice should be provided if students answer this item incorrectly. Retain this tallysheet until Activity 3-8 is completed and students' ability to construct a graph is recorded in column 5.

Column 5. Worksheet 3-9, Activity 3-8. See back of this tallysheet.

	1 (Jan. 5)	2 (Feb. 5)	3 (Jan. 5 to June 5)	4 (July 5)
KEY:	20° Other	15° Other	Same Down Up Different	OK Wrong Wrong Date Temperature
Attach ID list here.	01			

in the next activity.

Column 4. Question 4. Check the appropriate column to show a correct entry of 90° on July 5 or an X on the wrong date or temperature. Mark both if neither is correct. As each student is expected to construct a graph in the next activity, further practice should be provided if students answer this item incorrectly. Retain this tallysheet until Activity 3-8 is completed and students' ability to construct a graph is recorded in column 5.

Column 5. Worksheet 3-9, Activity 3-8. See back of this tallysheet.

	1 (Jan. 5)	2 (Feb. 5)	3 (Jan. 5 to June 5)	4 (July 5)
	20° Other	15° Other	Same Down Up Different	OK Wrong Date Temperature
KEY:				
01				
Attach ID				
list here.				

TALLYSHEET 3-4: Tally of Worksheet 3-7 and 3-8

Column 5. Worksheet 3-9, Activity 3-8. Make a check in the yes column if the student was able to accurately graph his high flyer data on Worksheet 3-9. Check no if the student was unsuccessful. Review this tallysheet to decide whether further practice is needed before continuing to Core B.

5 (High Flyer)		
Attach ID list here.	Yes	No
01		



Does this review give an accurate indication of student's ability to read  
and construct graphs? ☐ Yes ☐ No  
If not, what other evidence do you have of student learning?

UNIT III, CORE A  
ACTIVITY 3-7: "How Tall Is J. Oscar Hooperstraat"

Activity name suggested by class: \_\_\_\_\_ Teacher \_\_\_\_\_

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
Date taught (month and date, e.g. 11/2)						
Minutes of class time on science each day						
Minutes of preparation each day						
Students absent on each date (Use ID Number)						

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

5. Interest of class as expressed by apparent attention to what is happening.

Number of students responding with: Name students you noted especially: \_\_\_\_\_

	→	→	→	→	→
HIGH INTEREST					
MODERATE INTEREST					
INDIFFERENCE					
MODERATE RESISTANCE					
STRONG DISLIKE					
HARD TO RATE					

6. Equipment in kit: ☐ None ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use

7. Equipment I got: ☐ None ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:

☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless

-----keep as is----- revision suggested major changes described -----drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

Equipment I got: ☐ None ☐ Easy ☐ Hard to get, ☐ Hard to get, ☐ Unobtainable,  
needed to get but okay add to kit

8. Materials used:

Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is						
Revise slightly						
Revise much						
Worthless: omit						

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:

☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless  
--keep as is revision suggested major changes described --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed.  
What parts of this activity should be retained when the curriculum is revised?  
Page(s) \_\_\_\_\_

17. Did any student give away the answer to any question on Worksheet 3-7?  
☐ No ☐ Yes: Comment.

18. Complete Columns 1-4 of Tallysheet 3-4 but retain this tallysheet until data from  
Worksheet 3-8 is recorded in Column 5 when Activity 3-8 is completed.

19. Concern (or questions) about content:

20. Messages for staff (read immediately):

BSCS Evaluation: EMH Feedback Form 1c

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

SIDE A

Teacher \_\_\_\_\_

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.



## Me and my Environment

### OBJECTIVE FOCUS FOR THIS ACTIVITY

#### UNIT GOALS:

1. Realize and appreciate the energy inter-relationships between organisms.

#### CORE A OBJECTIVES:

3. Recognize that the amount of and the rate at which work is done is related to the amount of energy input.
4. Conclude that energy can be stored and later released.
5. Recognize different forms of energy (heat, light, chemical, and electrical).

### MATERIALS

### TEACHING STRATEGIES

#### Activity 3-8. The High Flyer

*Preceding activities have illustrated that energy is necessary to make something move or change. This activity demonstrates not only that the work released from a system is proportional to the amount of energy put into it, but that the work will not be released unless energy is put in. The student, through constructing a simple line graph, should begin to see that the direction of the line shows a relationship between variables.*

**FOCUS FOR THIS ACTIVITY****GOALS:**

- Realize and appreciate the energy inter-relationships between organisms.

**OBJECTIVES:**

- Recognize that the amount of and the rate at which work is done is related to the amount of energy input.
- Conclude that energy can be stored and later released.
- Recognize different forms of energy (heat, light, chemical, and electrical).

**UNIT III.****ENERGY RELATIONSHIPS IN MY ENVIRONMENT****BSCS****CORE A.****INTRODUCTION TO ENERGY****ACTIVITY 3-8. THE HIGH FLYER****TEACHING STRATEGIES****8. The High Flyer**

Activities have illustrated that energy is to make something move or change. This activity illustrates not only that the work released from is proportional to the amount of energy put in, but that the work will not be released unless put in. The student, through constructing a graph, should begin to see that the direct line shows a relationship between variables.

**ANTICIPATED STUDENT BEHAVIORS**

At the end of this activity, each student should:

- have played each position in the High Flyer Game.
- have recorded the correct data on Worksheet 3-8.
- have constructed a graph of High Flyer data on Worksheet 3-9.
- be able to make simple interpretations of graphed data.
- be able to state that until someone pulls the rubber band (puts energy in, or "starts" the energy) no energy will come out.
- be able to state that the more the rubber band is stretched (the more energy that is put in), the farther the cap goes (the more movement that results).
- observe that because of variations in game procedures, all graphs will not be exactly the same.

# ACTIVITY 3-8

66

## MATERIALS

- \*1 Ruler (12") per group
- \*2 Nails per group, 1" - 1 1/2" long
- \*1 Rubber band per group, 3 1/2"-4" unstretched length
- \*3 Pieces of cardboard or 1 piece of plywood per group at least 12" wide and 12" long (1 foot square)
- \*1 Flyer cap for each team (See Planning Guide)
- \*Hammer (if wood fling boards are used)
- Slide 3-17
- Worksheet 3-8
- Slide 3-18
- Worksheet 3-9
- \*35mm Slide projector

\*Not furnished in materials kit

## TEACHING STRATEGIES

### Teacher Preparation:

1. This activity may require a distance greater than the length of the average classroom. If, after trying the activity and finding that the classroom is not long enough, make arrangements to do the activity in the allway, gymnasium, or outdoors.
2. Three team members are required: a flyer, a measurer, and a spotter. Have the members of each team assign themselves to one of the three positions. Rotate students to give each member a turn at each position.
3. Some simple measurement (in feet and inches) is entailed in this activity. Depending on student background, it may be necessary to review or introduce some measurement skills.

### The positions:

1. Flyer - propels the cap.
2. Measurer - measures with a yardstick the distance that the cap was propelled.
3. Spotter - marks the spot where the propelled cap first touched the ground.

Help the students to assemble the high flyer following the directions below. (See Diagram 3-6)



## TEACHING STRATEGIES

### Preparation:

This activity may require a distance greater than the length of the average classroom. If, after the activity and finding that the classroom is not long enough, make arrangements to do the activity in the hallway, gymnasium, or outdoors.

Three team members are required: a flyer, a measurer, and a spotter. Have the members of each team assign themselves to one of the three positions. Rotate the positions to give each member a turn at each position.

A simple measurement (in feet and inches) is used in this activity. Depending on student background, it may be necessary to review or introduce some measurement skills.

### Procedure:

1. The flyer propels the cap.

2. The measurer - measures with a yardstick the distance the cap was propelled.

3. The spotter - marks the spot where the propelled cap first touches the ground.

Students assemble the high flyer following the steps below. (See Diagram 3.6)

## ANTICIPATED STUDENT BEHAVIORS

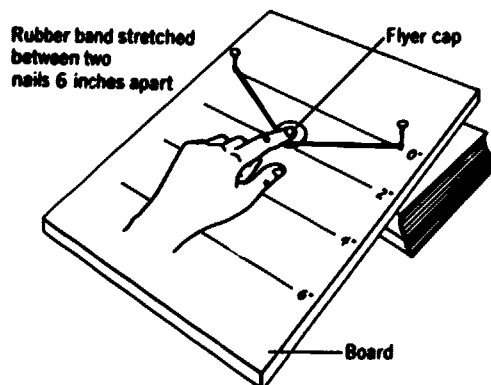


DISTRIBUTE MATERIALS



## MATERIALS

Diagram 3-6



Slide 3-17

Worksheet 3-8

Date \_\_\_\_\_ Name \_\_\_\_\_

	INCHES RUBBER BAND MOVED	2"	4"	6"
FLYER 1	FEET CAP TRAVELED			
FLYER 2	FEET CAP TRAVELED			
FLYER 3	FEET CAP TRAVELED			

## TEACHING STRATEGIES

1. Distribute Worksheet 3-8 to each team and the materials necessary to construct the high flyer.
2. Draw a 6" line one inch in from one edge of the board.
3. Pound in a nail at each end of the 6" line. (If cardboard is used instead of wood, tape at least three thicknesses together to obtain the necessary rigidity and use a stapler to staple each end of the rubber band to the cardboard.)
4. Stretch the rubber band between the two nails.
5. With a ruler place marks at 2", 4", 6" back from the original 6" line. Have students mark 2", 4", 6" on the board.

CONSTRUCTION



Project Slide 3-17.

Give the following instructions to the students for the use of the high flyer. Using a board, demonstrate how it operates.

DEMONSTRATION



## TEACHING STRATEGIES

ute Worksheet 3-8 to each team and the materials  
ry to construct the high flyer.

6" line one inch in from one edge of the board.

n a nail at each end of the 6" line. (If  
rd is used instead of wood, tape at least three  
sses together to obtain the necessary rigidity  
a stapler to staple each end of the rubber  
the cardboard.)

the rubber band between the two nails.

ruler place marks at 2", 4", 6" back from the  
l 6" line. Have students mark 2", 4", 6" on  
rd.

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-8

67

Students:

--construct high flyer board.

### CONSTRUCTION TIME



de 3-17.

llowing instructions to the students for the  
high flyer. Using a board, demonstrate how it



ACTIVITY 3-8

68

MATERIALS

TEACHING STRATEGIES

1. Angle the board by placing books or some other object under the front of the board so the front of the board is approximately 4" off the surface the board is resting on. (See Diagram 3-6)
2. The "Flyer" places a cap in front of both strands of the rubber band.
3. Pull the cap back until the back edge of the cap is even with the 2" mark. Hold the cap in position by pressing the cap against the board with a finger. (See Diagram 3-6)
4. Let'er fly by lifting the finger.
5. The spotter should mark immediately where the cap strikes the floor or ground for the first time. (Do not count misfires. Do not count any rolling or sliding which follows the touchdown of the cap.)
6. The measurer determines the distance the cap has travelled to the nearest foot by using a yardstick, making sure all measuring begins at the front edge of the board.
7. The flyer records on his worksheet the distance, as determined by the measurer. Each student, when it comes his turn to be the flyer, will use that data and record it on his worksheet.
8. Procedures 2-6 are repeated for two more projections, changing the stretch of the rubber band to 4" and 6".
9. After a student has recorded three (2", 4", and 6") flings on his worksheet, the team rotates positions until each member has had a turn at each position.

### TEACHING STRATEGIES

board by placing books or some other object in front of the board so the front of the board is approximately 4" off the surface the board is on. (See Diagram 3-6)

er" places a cap in front of both strands of the rubber band.

er" moves the cap back until the back edge of the cap is at the 2" mark. Hold the cap in position by pressing the cap against the board with a finger. (See Diagram 3-6)

er" releases the cap by lifting the finger.

er" should mark immediately where the cap touches the floor or ground for the first time. (Do not count misfires. Do not count any rolling or sliding which follows the touchdown of the cap.)

er" determines the distance the cap has traveled to the nearest foot by using a yardstick, and where all measuring begins at the front edge of the cap.

er" records on his worksheet the distance, as measured by the measurer. Each student, when it is his turn to be the flyer, will use that data and record it on his worksheet.

Steps 2-6 are repeated for two more projections, increasing the stretch of the rubber band to 4" and 6".

When each student has recorded three (2", 4", and 6") measurements on his worksheet, the team rotates positions until each member has had a turn at each position.

### ANTICIPATED STUDENT BEHAVIORS

Students:

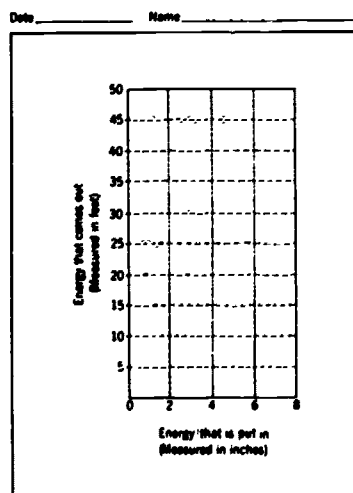
--follow the instructions given and perform the experiment.

--should rotate positions until each member has had a turn in each position.

## MATERIALS

Slide 3-18

Worksheet 3-9



## TEACHING STRATEGIES

FLING TIME

Now again focus the students' attention to Slide 3-17 and to their own individual Worksheets 3-8.

WHERE DID THE ENERGY COME FROM TO FLING THE CAP?

HOW DID WE CHANGE THE AMOUNT OF ENERGY THAT WE PUT INTO THE CAP?

Distribute Worksheet 3-9 (graph) to each student. Project the Slide 3-18 and discuss the label given each axis.

Ask:

(Student's name), HOW MANY FEET DID YOUR CAP GO WHEN YOU PULLED IT BACK TWO INCHES?

WHERE WOULD WE PLOT THIS ON OUR GRAPH?

Continue with these same two questions, using different students for 4" and 6" so you will have three points plotted. Then select another student to connect the dots.

Now direct students to complete a graph of their own data by plotting the points and then connecting them.



## TEACHING STRATEGIES

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-8

69

Students:

### FLING TIME

Focus the students' attention to Slide 3-17 and individual Worksheets 3-8.

FROM WHERE DID THE ENERGY COME FROM TO FLING THE

HOW MUCH ENERGY DID WE CHANGE THE AMOUNT OF ENERGY THAT WE PUT INTO THE CAP?

Hand out Worksheet 3-9 (graph) to each student. Project Slide 3-18 and discuss the label given each axis.

Ask (Student's name), HOW MANY FEET DID YOUR CAP TRAVEL WHEN YOU PULLED IT BACK TWO INCHES?

COULD WE PLOT THIS ON OUR GRAPH?

Ask these same two questions, using different stretch lengths of 4" and 6" so you will have three points. Then select another student to connect the dots.

Ask students to complete a graph of their own data by plotting the points and then connecting them.

--correctly respond, "From the elastic stretch," "My arm," "The pull," "From me."

--associate the relation of stretch to energy input.

--reply with the number of feet recorded on his worksheet.

--come to projector and make a dot on the appropriate point.

--recall graphing done in the previous activity and construct a graph of their data.



Continue by saying:

THIS SIDE OF THE GRAPH (point to graph on slide) SHOWS US THE ENERGY WE PUT INTO THE FLYER.

THIS SIDE OF THE GRAPH (again point) SHOWS US THE ENERGY THAT COMES OUT OF THE FLYER.

THE LINE ON THE GRAPH TELLS US HOW THE ENERGY WE PUT IN AND THE ENERGY COMING OUT GO TOGETHER.

WHAT HAPPENS TO THE LINE AS WE PUT MORE ENERGY IN? (Trace finger along energy input axis.)

WHAT HAPPENS TO THE LINE AS MORE ENERGY COMES OUT? (Trace finger along energy output axis.)

THEN WHAT DOES THE GRAPH SHOW US ABOUT THE AMOUNT OF ENERGY PUT IN COMPARED TO THE AMOUNT OF ENERGY COMING OUT?

All graphs may not be the same. This is to be expected, although the lines should be sloping upward as in the diagram. To introduce the reasons for variability of data, you might ask:

WHY AREN'T ALL THE GRAPHS EXACTLY THE SAME?

SO EVEN THOUGH ALL THE GRAPHS ARE NOT EXACTLY THE SAME, AGAIN WHAT DOES THE LINE ON THE GRAPH SHOW US ABOUT THE AMOUNT OF ENERGY PUT IN COMPARED TO THE AMOUNT OF WORK DONE?

## TEACHING STRATEGIES

saying:

IDE OF THE GRAPH (point to graph on  
SHOWS US THE ENERGY WE PUT INTO  
FLYER.

IDE OF THE GRAPH (again point) SHOWS US  
ENERGY THAT COMES OUT OF THE FLYER.

NE ON THE GRAPH TELLS US HOW THE ENERGY  
IN AND THE ENERGY COMING OUT GO TOGETHER.

APPENS TO THE LINE AS WE PUT MORE ENERGY  
(Trace finger along energy input axis.)

APPENS TO THE LINE AS MORE ENERGY COMES  
(Trace finger along energy output axis.)

HAT DOES THE GRAPH SHOW US ABOUT THE  
OF ENERGY PUT IN COMPARED TO THE  
OF ENERGY COMING OUT?

may not be the same. This is to be expected,  
the lines should be sloping upward as in the  
to introduce the reasons for variability of data,  
ask:

AREN'T ALL THE GRAPHS EXACTLY THE SAME?

N THOUGH ALL THE GRAPHS ARE NOT EXACTLY  
ME, AGAIN WHAT DOES THE LINE ON THE GRAPH  
S ABOUT THE AMOUNT OF ENERGY PUT IN COM-  
TO THE AMOUNT OF WORK DONE?

## ANTICIPATED STUDENT BEHAVIORS

Students:

--reply, "The line goes up," "It gets higher."

--reply, "The line goes up," "It gets higher."

--infer that the energy output is directly related  
to the energy input.

--infer that not all students will pull their cap to  
the same point before releasing, not all rubber  
bands are exactly the same, not everybody measures  
the same, the slope of the boards may differ, etc.

--conclude that the work output is directly related  
to the energy input.



UNIT III, CORE A  
ACTIVITY 3-8: "The High Flyer"

Activity name suggested by class:

Teacher

BSCS USE: Post Day 3 Day 4 Day 5 Day 6  
Tally Rev

Day 1 Day 2 Day 3 Day 4 Day 5 Day 6

1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes of preparation each day						
4.	Students absent on each date (Use ID Number)						

5. Interest of class as expressed by apparent attention to what is happening.Number of students responding with: Name students you noted especially:  
(Number)

HIGH INTEREST	_____
MODERATE INTEREST	_____
INDIFFERENCE	_____
MODERATE RESISTANCE	_____
STRONG DISLIKE	_____
HARD TO RATE	_____

6. Equipment in kit: ☐ None ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use7. Equipment I got: ☐ None ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:	Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:

☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless

-----keep as is-----revision suggested-----major changes described-----drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

needed fragile complicated to use

Equipment I got: ☐ None ☐ Easy ☐ Hard to get, ☐ Hard to get, ☐ Unobtainable,  
needed to get but okay add to kit add to kit

Materials used:	Worksheet # ! #	Game #	Slides (show slide nos.)	Transparency # ! #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

8. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:  
9. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:  
10. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -Pages and Problem:  
11. Were clues to success and reviews of success helpful? ☐ Yes ☐ No -Why not?  
12. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:  
13. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:  
14. Your rating of this activity:  
☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless  
-----keep as is revision suggested major changes described-----drop it-----

## SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

15. There are always parts of activities that are good and need not be changed.  
What parts of this activity should be retained when the curriculum is revised?  
Page(s) \_\_\_\_\_:

16. Rate each student's ability to graph his data on Worksheet 3-9 and tally the results in Column 5 of Tallysheet 3-4 which was also used in Activity 3-7.  
17. Send in student worksheets 3-8 and 3-9 with the tallysheet and this feedback form.  
18. Concern (or questions) about content:

19. Messages for staff (read immediately):

BSCS Evaluation: EMH Feedback Form 1c

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

UNIT III, CORE A  
ACTIVITY 3-8: "The High Flyer"

Teacher \_\_\_\_\_

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about ever/thing every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.

UNIT III  
REACTIONS TO CORE A

1. Was the background information for this core adequate? ☐ Yes ☐ No  
Comment:
2. Was it clear to you why these particular activities were chosen and the direction they were leading? ☐ Yes ☐ No  
Comment:
3. Did the activities fulfill the purposes stated in the Guide for this core? ☐ Yes ☐ No  
Comment:
4. How would you increase the clarity of this core for students? (Help them understand why they are doing these activities.)
5. Is there a practical (take-home) value for your students in these activities? ☐ Yes ☐ No  
6. If yes, what do you see as the "take-home" lesson? If no, what is needed?
7. In these materials, what things did your students find difficult to do?
8. Should there be more clues to success or reviews of success in this core? ☐ Yes ☐ No  
Comment:
9. Was there too much reading and too many teacher directions? ☐ Yes ☐ No  
Comment:
10. Did you make use of the Planning Guide? ☐ Yes ☐ No  
Comment:

5. Is there a practical (take-home) value for your students in these activities? ☐ Yes ☐ No  
6. If yes, what do you see as the "take-home" lesson? If no, what is needed?

7. In these materials, what things did your students find difficult to do?

8. Should there be more clues to success or reviews of success in this core? ☐ Yes ☐ No  
Comment:

9. Was there too much reading and too many teacher directions? ☐ Yes ☐ No  
Comment:

10. Did you make use of the Planning Guide? ☐ Yes ☐ No  
Comment:

11. If you could teach your way, rather than following the Guide, how would you do it?

12. Which of your students do you believe were unsuccessful in achieving the objectives of this core of activities? Explain.

BSCS Evaluation: EMH Feedback Form 2a

**NEW STUDENTS ENTERING DURING THIS CORE**

Date Entered	Last Name	Name Used	Ethnic Group	Sex	Birthdate	Test date	Test	Total
			W B S O	M F			W B O	
			W B S O	M F			W B O	
			W B S O	M F			W B O	
			W B S O	M F			W B O	

**STUDENTS DROPPED IN THIS PERIOD**

Date Dropped	Last Name	First

W = white  
 B = black  
 S = Spanish-  
     American  
 O = other

W = WISC  
 B = Binet  
 O = other  
     (name)

**ADDITIONAL INFORMATION ON NEW STUDENTS:**

NEW STUDENTS ENTERING DURING THIS CORE

Group	Sex	Birthdate	Test date	Test	Total	Verbal	Performance	Previous Test Score
S O	M F			W B O				
S O	M F			W B O				
S O	M F			W B O				
S O	M F			W B O				

e  
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W = WISC  
 B = Binet  
 O = other  
 (name)



## Me and my Environment

### UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

#### CORE B. ENERGY IN FOOD

#### AIMS FOR ME AND MY ENVIRONMENT

1. DEVELOPMENT IN EACH CHILD OF A SENSE OF IDENTITY AS A PERSON WHO HAS SOME DEGREE OF CONTROL OVER AND CAN ACT ON HIS ENVIRONMENT. This will lead to a degree of self-determination based on a rational coping with situations rather than on a passive compliance or an impulsive response to problems.
2. DEVELOPMENT IN EACH CHILD OF A SUCCESS SYNDROME. More than anything else, each activity is intended to be a success experience for each child. It is the teacher's responsibility -- almost obligation -- to see that each child succeeds at a level that is challenging to his abilities and that preserves his self-respect. It is a further responsibility of the teacher to point out his achievement. The students as a group should help each individual fit what he has done into a pattern of accomplishment.
3. DEVELOPMENT IN EACH CHILD OF AN INTEREST THAT COULD BECOME A HOBBY OR AVOCATION OVER A LIFETIME (through an exposure to an array of experiences in science). It is hoped that many children will find some area -- perhaps growing plants, caring for animals, identifying flowers, collecting things, or simply enjoying outings into the country -- that they feel strongly about and can develop some competence or knowledge in. This would provide a means of self-expression, and (perhaps) allow some degree of sharing or involvement with others.
4. DEVELOPMENT IN EACH CHILD OF A SENSE OF RELATIONSHIP AND EMPATHY WITH OTHER LIVING THINGS. It is hoped that this will lead to a positive regard and caring about what affects them as individuals and as a group, because what affects them affects the community of man.
5. DEVELOPMENT IN EACH CHILD OF AN UNDERSTANDING OF ENVIRONMENTAL CONDITIONS that will lead to a sense of responsibility for the environment and actions that protect or improve it.

1. Realize and appreciate the energy
2. Appreciate and understand man's

#### OBJECTIVES

1. Recognize that food is our main source of energy
2. Appreciate that being alive is a process of energy exchange
3. Determine that different foods have different energy values
4. Determine that increased activity requires more energy
5. Realize that maintaining one's health requires a balance of energy intake and expenditure, and that nutritional needs in addition to energy



UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE B. ENERGY IN FOOD



BSCS

UNIT III GOALS

1. Realize and appreciate the energy interrelationships between organisms.
2. Appreciate and understand man's dependence on green plants for food.

OBJECTIVES OF CORE B

1. Recognize that food is our main source of energy.
2. Appreciate that being alive is a dynamic state requiring energy.
3. Determine that different foods have different amounts of energy.
4. Determine that increased activity requires an increased amount of energy.
5. Realize that maintaining one's health requires eating foods which fulfill nutritional needs in addition to energy needs.

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## Me and my Environment

### UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

#### CORE B. ENERGY IN FOOD

##### CORE B RATIONALE

People, like other animals, require a continual input of food (energy and raw materials) to maintain themselves and their activities. Living organisms may be viewed as energy-possessing systems which obtain energy from their environment. Supporting the metabolism of an average person requires the input of a minimum number of calories per day. It is the purpose of Core B to establish in the mind of the student that energy is indeed required to live, that food is a person's source of energy, and that variations in the makeup of foods necessitate a balanced diet in terms of energy and health. This is the general picture we wish to examine after the basic ideas of what energy is have been established.

In the first activity of this Core (Food "Go Power") a brief review of some of the basic concepts of energy, as established in Core A, is followed by the rapid burning and explosion of finely powdered plant material. This demonstrates quite vividly to the student that food material does indeed contain energy. The actual burning of familiar food, causing their pinwheels to turn, shows the students that food definitely contains energy that can "do something."

Since all the examples of energy so far have involved obvious movement, it is likely that a number of students will have the impression that energy is being used only when visible movement can be observed. Activity 3-10 (It Takes Energy To Live) is designed to help the student realize that simply being alive, involving activities not visible to the eye, requires energy. Measuring the heat output resulting from more vigorous activity will illustrate that increased activity requires more energy. The activity also provides an opportunity for the student to practice graphing skills by constructing a line graph of temperature over time recorded by the student.

Activity 3-11 (Measuring With A Balance) is an activity only indirectly related to food and energy. In order to develop the concept

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The energy content amount of energy released completely. The figurative values of foodstuffs. concept.

In Activity 3-9 (It is ignited and blows the referred to as "club material normally used as food, question whether the "it could be, although it is it is used in the activity. The material is used in When the powder is sprayed ignite all at once because to the air. The rapid cause the air inside the

Obviously our body. Enzyme-controlled reaction a time and stored temporary reaction.

Energy is constant temperature at approximately reactions take place in (To Live) a hand placed in water, even though the the water temperature is utilization and results

### UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

#### CORE B. ENERGY IN FOOD



BSCS

#### BACKGROUND INFORMATION FOR THE TEACHER

The energy content of any food is measured in terms of calories, the amount of energy released when a specific amount of dry foodstuff is burned completely. The figures obtained from this burning are the combustion values of foodstuffs. The activities in this core develop around this concept.

In Activity 3-9 (Food "Go Power"), "Powdered Food" (lycopodium spores) is ignited and blows the top off a can. Lycopodium is a plant commonly referred to as "club moss." While the spores of this plant are not normally used as food, they do resemble yellow flour. If the students question whether the "yellow flour" is really food or not, state that it could be, although it is not normally used as food, and that the reason it is used in the activity is that it demonstrates the "go power" best. The material is used in this activity because of its extreme flammability. When the powder is sprayed and suspended in the air, the tiny particles ignite all at once because of the large surface area per volume exposed to the air. The rapid burning and resulting increase in temperature cause the air inside the can to expand and blow the lid off.

Obviously our bodies do not explode when our food is "burned." Enzyme-controlled reactions cause the energy to be released a little at a time and stored temporarily rather than to be released in one sudden reaction.

Energy is constantly being used by our systems to maintain our body temperature at approximately 98.6° F., the temperature at which the bodily reactions take place most efficiently. In Activity 3-10 (It Takes Energy To Live) a hand placed in cold water will raise the temperature of that water, even though the hand does not move. Movement of the hand raises the water temperature proportionately because of increased energy utilization and resultant loss of heat to the water.



## Me and my Environment

### UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

#### CORE B. ENERGY IN FOOD

##### CORE B RATIONALE (continued)

that equal amounts of different foods release different amounts of energy when burned, it is essential that the student be able to weigh equal portions to be tested. This activity introduces the student to the equal arm balance and its practical applicability, and provides an opportunity to practice weighing small objects or amounts of materials.

In Activity 3-12 (Measuring Energy Values) the student constructs a simple calorimeter (a device for measuring heat changes) in order to gather quantitative data about the energy contained in different kinds of foods. Using the measuring skills from the previous activity the students weigh equal portions of food, burn them under a test tube of water, and determine the temperature before and after burning. The resulting changes in temperature serve to establish the fact that different foods vary in their energy content. The term "calorie" is introduced and defined as the word used to describe the amount of energy in foods. Through the use of a calorie book the students discover they can look up the energy (calorie) content of most foods. This again reinforces the idea that all foods do not contain the same amount of energy.

It is important that the student not be left with the false impression that the calorie content of foods is the only consideration. Definite substances must be provided from which organisms can grow and repair tissue and maintain overall health. For example, no person remains healthy without proteins in his food. Vitamins and minerals, too, are necessary for growth and health, although needed in only very small amounts. By playing the *Full and Healthy* game in Activity 3-13, the students become aware of their nutritional needs. Each student who is playing the game is required to complete a balanced daily diet by selecting correct portions of food from the basic four food groups. The activity is presented to stress the idea that while eating food

##### BACKGROUND

The principal of v with weights should be Activity 3-11 (Measurin program is surprisingly instructions in the act

In Activity 3-12 ( the calorimeter, roughl The change in heat duri the total energy change heat changes when food quantity of some materi liberated is measured a calorimeter as construc to escape and is theref for the concept develop

The basic unit for when considering the he kilocalorie (Calorie sp calories. This large c temperature of 1,000 gr unit almost always used content of foods.

The basic four foo And Healthy") are the f health experts.



BSCS

## UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

## CORE B. ENERGY IN FOOD

## BACKGROUND INFORMATION FOR THE TEACHER (continued)

The principal of weighing an object or substance by balancing it with weights should be apparent when carrying out the instructions in Activity 3-11 (Measuring With A Balance). The balance supplied with this program is surprisingly accurate if set up and used according to the instructions in the activity.

In Activity 3-12 (Measuring Energy Values) the students, using the calorimeter, roughly approximate the caloric content of selected foods. The change in heat during the burning of a food tells us a great deal about the total energy change in the reaction. The major device for measuring heat changes when food is burned is a calorimeter. A carefully weighed quantity of some material is burned within the calorimeter, and the heat liberated is measured as a rise in the temperature of a water bath. The calorimeter as constructed and used by the students allows too much heat to escape and is therefore not very accurate. It is, however, adequate for the concept developed in this activity.

The basic unit for the measurement of heat is the calorie. However, when considering the heat of chemical reactions, scientists often use the kilocalorie (Calorie spelled with a capital "C"), rather than the small calories. This large calorie is the amount of heat needed to raise the temperature of 1,000 grams of water one degree centigrade. This is the unit almost always used to express food energy requirements and the caloric content of foods.

The basic four food groups used in Activity 3-13 (A Winner Is "Full And Healthy") are the food groups most commonly accepted by dieticians and health experts.



## Me and my Environment

### UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

#### CORE B. ENERGY IN FOOD

##### CORE B RATIONALE (continued)

for energy is important and necessary, it is not the only criterion which should be used in selecting foods to eat.

Throughout Core B, in the examination of food energy, the emphasis is on student involvement and participation, constructing and manipulating science apparatus, data gathering, and game playing. Activity 3-14 (Popeye's Quick Energy -- Review Of Success), the final activity in Core B, uses a short story to stimulate discussion. The student completes a worksheet designed to find out how well he understands the concept of energy and its relationship to food.

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE B. ENERGY IN FOOD



BSCS

the only criterion


energy, the  
on, constructing  
, and game playing.  
(Success), the final  
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to food.



## Me and my Environment

### UNIT III CORE B

## PLANNING GUIDE

NOTE: Some activities (indicated in italics and an  in the margin) be prepared several days or weeks in advance. Use this as a teaching and preparation schedule. All supplies needed


Activity Number, Page, Tentative Teaching Date	Check List of Supplies Needed		(Italics and
	Materials You Furnish	Materials in Supply Kit	
3-9. Food "Go Power"  Page _____ Date planned _____	Candle Matches Clean paint can with lid Pin wheels Aluminum foil Foods that burn	Lycopodium spores Measuring spoons Vinyl tubing Syringe bulb Tweezers	Two inches or less One book Quart size probab <i>From Activity 3-3</i>  Examples: marshmallows potato chips walnuts peanuts dried fruit Small amount One set Three feet One One per student NOTE: <i>Practice to</i> <i>class to a</i>
3-10. It Takes Energy To Live  Page _____ Date planned _____	35mm Slide projector Paper towels or sponges Masking tape Large containers  Ice Timer or clock with second hand Felt tip pens		Class supply  <i>Three containers</i> <i>enough to place</i> <i>or something si</i> Five pound bag  Class supply



# PLANNING GUIDE



BSCS

Some activities (indicated in italics and an  in the margin) must be prepared several days or weeks in advance. Use this summary as a teaching and preparation schedule. All supplies needed are listed.


List of Supplies Needed		Notes and Suggestions to Teacher (Italics and Arrow Indicate Advance Preparation Directions)
ish	Materials in Supply Kit	
id	Lycopodium spores Measuring spoons Vinyl tubing Syringe bulb Tweezers	Two inches or less in length One book Quart size probably the best. Other sizes will work. <i>From Activity 3-3. One per student</i>  Examples: marshmallows potato chips walnuts peanuts dried fruit Small amount One set Three feet One One per student <i>NOTE: Practice the demonstration in this activity before class to assure success.</i>
s		Class supply  Three containers per group of four students. Must be large enough to place hands in. Suggest: 1/2 gallon milk cartons or something similar. Five pound bag  Class supply
cond		



## Me and my Environment

### UNIT III CORE B

## PLANNING GUIDE

NOTE: Some activities (indicated in *italics* and an  in the margin) should be prepared several days or weeks in advance. Use this as a teaching and preparation schedule. All supplies needed are listed in the table.

Activity Number, Page, Tentative Teaching Date	Check List of Supplies Needed		<i>(Italics)</i>
	Materials You Furnish	Materials in Supply Kit	
3-10. It Takes Energy To Live (Continued)		Metal backed thermometers Thermometer Worksheet 3-10 Worksheet 3-11 Slide 3-19 Slide 3-20	Three per group Demonstration Hand Movement Graph of Hand Worksheet 3-10 Worksheet 3-11
3-11. Measuring With A Balance  Page _____ Date planned _____	Pliers or strong scissors Objects to weigh	Equal arm balance kits	One <i>Objects might include:</i> paper clips pennies erasers Life Savers pencils rubber bands ping pong balls popcorn styrofoam balls marbles, etc. Four per class

## PLANNING GUIDE



**BSCS**

Some activities (*indicated in italics and an arrow in the margin*) must be prepared several days or weeks in advance. Use this summary as a teaching and preparation schedule. All supplies needed are listed.


List of Supplies Needed		Notes and Suggestions to Teacher ( <i>Italics and Arrow Indicate Advance Preparation Directions</i> )
Finish	Materials in Supply Kit	
	Metal backed thermometers Thermometer Worksheet 3-10 Worksheet 3-11 Slide 3-19 Slide 3-20	Three per group of four students Demonstration model Hand Movement Experiment Graph of Hand Movement Experiment Worksheet 3-10 Worksheet 3-11
ssors	Equal arm balance kits	One <i>Objects might include:</i> paper clips pennies erasers Life Savers pencils rubber bands ping pong balls popcorn styrofoam balls marbles, etc. Four per class




## Me and my Environment

UNIT III  
CORE B

## PLANNING GUIDE


NOTE: Some activities (indicated in italics and an  in the margin) be prepared several days or weeks in advance. Use this as a teaching and preparation schedule. All supplies needed.

Activity Number, Page, Tentative Teaching Date	Check List of Supplies Needed		(Italics and  in the margin)
	Materials You Furnish	Materials in Supply Kit	
3-12. Measuring Energy Values  Page _____ Date planned _____	Can openers Large juice can  Pencils or sticks Hardware cloth Matches Hot pads Foods that burn  String Aluminum foil Pliers 35mm Slide projector	           Balances used in Activity 3-11 Test tubes Black rubber washers Metal backed thermometers Beakers Worksheet 3-12 Worksheet 3-13 Slide 3-21 Slide 3-22 Slide 3-23 Calorie books Camera (Polaroid Square Shooter)	Can punch and One per team of collected in Two per pair of One piece 13" s Many books (fir Several per tea Examples: peanuts walnuts marshmallows potato chips, 12" piece per t One piece per t One  Large Pyrex tub One per team of One per team of Two 250 ml beak How To Make A C Calorimeter Dat Worksheet 3-12 Peanuts and sug Worksheet 3-13 Eight per class

# PLANNING GUIDE



BSCS

The activities (indicated in italics and an  in the margin) must be prepared several days or weeks in advance. Use this summary as a teaching and preparation schedule. All supplies needed are listed.

List of Supplies Needed		Notes and Suggestions to Teacher (Italics and Arrow Indicate Advance Preparation Directions)
Activity	Materials in Supply Kit	
		<p>Can punch and standard opener. Several if possible.  One per team of two students. Large juice cans should be collected in advance.  Two per pair of students  One piece (3" square) per team of two students  Many books (fireplace type preferable)  Several per team of two students  Examples:      peanuts      walnuts      marshmallows      potato chips, etc.  12" piece per team of two students  One piece per team of two students  One</p>
	<p>Balances used in Activity 3-11  Test tubes  Black rubber washers  Metal backed thermometers  Beakers  Worksheet 3-12  Worksheet 3-13  Slide 3-21  Slide 3-22  Slide 3-23  Calorie books  Camera (Polaroid Square Shooter)</p>	<p>Large Pyrex tubes. One per team of two students  One per team of two students  One per team of two students  Two 250 ml beakers per team of two students  How To Make A Calorimeter  Calorimeter Data Chart  Worksheet 3-12  Peanuts and sugar burning  Worksheet 3-13  Eight per class</p>

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# Me and my Environment

## UNIT III CORE B

## PLANNING GUIDE


NOTE: Some activities (indicated in italics and an arrow in the margin) be prepared several days or weeks in advance. Use this a teaching and preparation schedule. All supplies need

Activity Number, Page, Tentative Teaching Date	Check List of Supplies Needed		(Italics and arrow in the margin)
	Materials You Furnish	Materials in Supply Kit	
3-13. A Winner Is "Full And Healthy"  Page _____ Date planned _____	35mm Slide projector	Game - <i>Full and Healthy</i> Wall chart Calorie book Slide 3-24 Slide 3-25 Worksheet 3-14 Slide 3-26 Worksheet 3-15 Slide 3-27	One deck of cards "Food Groups" One Chocolate bar Eating a plate Score Sheet for Worksheet 3-14 Score Sheet for Worksheet 3-15
3-14. Popeye's Quick Energy--Review Of Success  Page _____ Date planned _____	35mm Slide projector	Worksheet 3-16 Slide 3-28 Slide 3-29	Popeye Worksheet Front of Worksheet Back of Worksheet

## PLANNING GUIDE



**BSCS**

Activities (indicated in italics and an  in the margin) must be prepared several days or weeks in advance. Use this summary as a teaching and preparation schedule. All supplies needed are listed.

List of Supplies Needed		Notes and Suggestions to Teacher (Italics and Arrow Indicate Advance Preparation Directions)
h	Materials in Supply Kit	
	Game - <i>Full and Healthy</i> Wall chart Calorie book Slide 3-24 Slide 3-25 Worksheet 3-14 Slide 3-26 Worksheet 3-15 Slide 3-27	One deck of cards per group of four students "Food Groups" One Chocolate bar Eating a plate of chocolate bars Score Sheet for <i>Full and Healthy</i> Worksheet 3-14 Score Sheet for <i>Full and Healthy</i> -- with energy Worksheet 3-15
	Worksheet 3-16 Slide 3-28 Slide 3-29	Popeye Worksheet Front of Worksheet 3-16 Back of Worksheet 3-16



## Me and my Environment

### OBJECTIVE FOCUS FOR THIS ACTIVITY

#### UNIT GOALS:

1. Realize and appreciate the energy inter-relationships between organisms.

#### CORE B OBJECTIVES:

1. Recognize that food is our main source of energy.

### MATERIALS

#### Explosion can apparatus:

Lycopodium spores  
Measuring spoons  
\*Candle (2" or less)

(Continued on next page)

\*Not furnished in materials kit

### TEACHING STRATEGIES

#### Activity 3-9. Food "Go Power"

*Having previously inferred that there is energy stored in chemicals, and that energy is anything that moves or changes something, students will now begin to relate this concept to themselves and to the food they eat.*

#### Teacher Preparation:

(Practice this demonstration before class to become accustomed to the loud and impressive reaction as the lid explodes from the top of the can.)



FOCUS FOR THIS ACTIVITY

GOALS:

- Realize and appreciate the energy inter-relationships between organisms.

OBJECTIVES:

- Recognize that food is our main source of energy.

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE B. ENERGY IN FOOD

ACTIVITY 3-9. FOOD "GO POWER"



**TEACHING STRATEGIES**

9. Food "Go Power"

Previously inferred that there is energy stored in food, and that energy is anything that moves or does something, students will now begin to relate energy to themselves and to the food they eat.

Preparation:

Perform this demonstration before class to become familiar with the loud and impressive reaction as the lid is popped from the top of the can.)

**ANTICIPATED STUDENT BEHAVIORS**

At the end of this activity, each student should:

- have recalled the definition of energy, and the different kinds of energy.
- have described a way stored energy is released.
- have stated that food gives our bodies energy to move or change.
- have observed the demonstration of exploding "yellow flour."
- have designed and performed an experiment to see if food has stored energy that can be used to move or change something.
- have reported what he learned about food to the class.
- have inferred that there is stored energy in food.
- have identified food as his own body's source of energy.

# ACTIVITY 3-9

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## MATERIALS

### \*Matches

3 Feet vinyl tubing

Syringe bulb

\*Clean paint can with lid

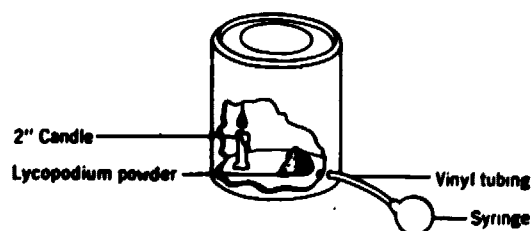
\*Pinwheels from Activity 3-3 (1 per student)

Tweezers (1 per student)

\*Aluminum foil

\*Foods (marshmallows, potato chips, walnuts, dried fruit)

Diagram 3-7



\*Not furnished in materials kit

## TEACHING STRATEGIES

1. Assemble the explosion device in advance according to the directions below. (See Diagram 3-7.)

- a. Cut a hole the size of the diameter of the vinyl tubing in the side of the paint can (near the bottom). This may be done with a can opener, large nail, drill, or tin snips. Bend sharp edges inside or cut them off.
- b. Insert the vinyl tubing through the hole. Make as tight a fit as possible.
- c. Attach the syringe bulb to end of tubing, making sure that there is a fairly tight connection.
- d. Using a drop of wax, fasten a candle to the bottom of the can. A short candle (2" or less) works best.
- e. Place approximately two teaspoons of "yellow flour" inside the can in front of the tubing opening. Rake the flour into a mound.

2. Some suggestions and reminders that you might give individual students as work on the pinwheel-food burning experiment progresses:

- a. Make sure the foods used burn easily. Dried foods with a high oil content are especially useful.
- b. Make sure that the food is burning before being placed under the pinwheel so that the burning match is not associated with making the wheel turn.

### TEACHING STRATEGIES

Prepare the explosion device in advance according to the directions below. (See diagram 3-7.)

Make a hole the size of the diameter of the vinyl tubing in the side of the paint can (near the bottom). This may be done with a can opener, large nail, drill, or tin snips. Remove sharp edges inside or cut them off.

Insert the vinyl tubing through the hole. Make as tight a fit as possible.

Attach the syringe bulb to end of tubing, making sure that there is a fairly tight connection.

Using a drop of wax, fasten a candle to the bottom of the can. A short candle (2" or less) works best.

Place approximately two teaspoons of "yellow flour" inside the can in front of the tubing opening. Rake the flour into a mound.

Suggestions and reminders that you might give individual students as work on the self-food burning experiment progresses:

Make sure the foods used burn easily. Dried foods with a high oil content are especially useful.

Make sure that the food is burning before being placed under the pinwheel so that the burning match is not associated with turning the wheel turn.

### ANTICIPATED STUDENT BEHAVIORS

## MATERIALS

## TEACHING STRATEGIES

- c. Cover the work area with aluminum foil to avoid burning the table top.
- d. Food may be held by forceps or a dissecting needle, then lit, and held under the pinwheel.

Begin this activity by briefly reviewing concepts in Core A. One suggestion is to divide the class into two teams (boys versus girls, A versus B, one side of the room versus another side), and ask questions in an alternating fashion to each team. See which team answers the most questions correctly. Select a scorekeeper. Ask such questions as:

WHAT IS ENERGY?

WHAT KIND OF ENERGY MADE THE CRYSTALS MOVE IN ONE OF YOUR FIRST EXPERIMENTS?

WHAT KIND OF WATER HELPED THE ALKA-SELTZER TO RELEASE ITS ENERGY THE FASTEST?

Some students may confuse the two experiments that utilize Alka-Seltzer and respond "Chemical Energy." If such is the case give them credit, but have them recall that the experiment showed that the hotter the water, the faster the energy in the Alka-Seltzer was released.

IS HEAT ENERGY THE ONLY KIND OF ENERGY WE SEE DO SOMETHING?

WHAT OTHER KINDS OF ENERGY ARE THERE?

DOES A MACHINE OR BODY ALWAYS HAVE TO USE UP ENERGY RIGHT AWAY?

IF IT ISN'T USED RIGHT AWAY, WHAT HAPPENS TO IT?

## TEACHING STRATEGIES

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-9

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Students:

Cover the work area with aluminum foil to avoid burning the table top.

Food may be held by forceps or a dissecting needle, then lit, and held under the pinwheel.

For this activity by briefly reviewing concepts in Core A, a suggestion is to divide the class into two teams (boys versus girls, A versus B, one side of the room versus the other side), and ask questions in an alternating fashion. See which team answers the most questions. Select a scorekeeper. Ask such questions as:

WHAT IS ENERGY?

--recall past experiences in Core A and respond, "Anything that moves or changes something."

WHAT KIND OF ENERGY MADE THE CRYSTALS MOVE IN ONE OF OUR FIRST EXPERIMENTS?

--respond, "Heat energy."

WHAT KIND OF WATER HELPED THE ALKA-SELTZER TO RELEASE ITS ENERGY THE FASTEST?

--respond, "Hot water."

Students may confuse the two experiments that utilize Alka-Seltzer and respond "Chemical Energy." If such is the case, give them credit, but have them recall that the experiment showed that the hotter the water, the faster the Alka-Seltzer was released.

IS HEAT ENERGY THE ONLY KIND OF ENERGY WE SEE IN OUR EXPERIMENTS?

--respond, "No."

WHAT OTHER KINDS OF ENERGY ARE THERE?

--respond, "Sun," "Electrical," "Chemical," "Muscle."

DO ALL MACHINES OR BODIES ALWAYS HAVE TO USE UP ENERGY RIGHT AWAY?

--reply, "No."

IF ENERGY ISN'T USED RIGHT AWAY, WHAT HAPPENS TO IT?

--reply, "It can be kept," "It can be stored."

ACTIVITY 3-9

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MATERIALS

TEACHING STRATEGIES

More questions of this type may be asked by the teacher, but those listed above should be sufficient to recall information from Core A. Tally the points won by each team and declare the winner. (Perhaps the winning team could eat the leftover food from Part II of this activity.) The teacher should copy and tally the responses given to each question if possible to check concept attainment. If responses are few or incorrect, further discussion of concepts covered in Core A should be pursued before proceeding.

When the class is again assembled in one group ask:

CAN OUR BODIES MOVE AND DO THINGS?

WHAT ARE SOME EXAMPLES OF WHAT THEY CAN DO?

WHAT DOES OUR BODY NEED IN ORDER TO DO THINGS?

If the word "food" is not specifically mentioned, ask:

WHAT DO WE CALL THE STUFF OUR BODIES USE TO GIVE US ENERGY?

Make sure students say "food" before asking:

DO FOODS STORE ENERGY?

Then say:

TO FIND OUT, LET'S TRY AN ACTIVITY WITH "YELLOW FLOUR" TO SEE IF IT CAN GIVE OFF ENERGY.

Show students the explosion can apparatus that you assembled in advance. Walk around the room so each student can see the inside of the apparatus. Explain to the students how it was assembled and what it consists of.

## TEACHING STRATEGIES

s of this type may be asked by the teacher, ted above should be sufficient to recall rom Core A. Tally the points won by each are the winner. (Perhaps the winning team leftover food from Part II of this activity.) should copy and tally the responses given to if possible to check concept attainment. are few or incorrect, further discussion of red in Core A should be pursued before

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STORE ENERGY?

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the explosion can apparatus that you alivance. Walk around the room so each ee the inside of the apparatus. Explain ts how it was assembled and what it consists

## ANTICIPATED STUDENT BEHAVIORS

Students:

--respond, "Yes."

--respond, "Throw a ball," "Run," "Lift a book," "Heart pumps," "Breathe," etc.

--respond, "Energy," "Food."

--respond, "Food."

--respond, "Yes," "I don't know," "Perhaps."

--carefully inspect the apparatus and note the components of its operation.

## MATERIALS

## TEACHING STRATEGIES

Be sure they see the "yellow flour" added, or have a student add the "yellow flour." Have them stand well away from the can. Light the candle and place the paint lid on firmly and squarely. Now squeeze the syringe bulb to blow the "yellow flour" directly into the candle flame. A loud and impressive reaction will occur as the lid explodes from the top of the can.

Reaction of the students will very likely be one of great surprise and enthusiasm. Repeat the experiment if they demand. Students may like to try it, and, if done under the supervision of the teacher, should be allowed to do so.

Now ask:

WHY DID WE DO THIS ACTIVITY?

DID THE FOOD HAVE ENERGY?

If the responses do not indicate that the students associate the explosion with food energy being released, repeat the experiment and expand the explanation. You may wish to have the students add the flour and set off the explosion. Then ask again:

DID THE FOOD HAVE ENERGY?

HOW DO YOU KNOW?

IN WHAT FORM DID THE FOOD HAVE ENERGY?

After the student has observed the explosion and made the inference that food has energy, explain why the can worked (refer to content explanation at beginning of Core B for information).



## TEACHING STRATEGIES

See the "yellow flour" added, or have a student add the "yellow flour." Have them stand well away from the can. Light the candle and place the paint can flat and squarely. Now squeeze the syringe and blow the "yellow flour" directly into the candle flame. A loud and impressive reaction will occur as the flour falls from the top of the can.

Most of the students will very likely be one of great interest and enthusiasm. Repeat the experiment if they want. Students may like to try it, and, if done under supervision of the teacher, should be allowed to do so.

HOW DO WE DO THIS ACTIVITY?

DOES FOOD HAVE ENERGY?

If the responses do not indicate that the students associate the explosion with food energy being released, repeat the experiment and expand the explanation. You may wish to have the students add the flour and set off the explosion. Then ask again:

DOES THE FOOD HAVE ENERGY?

HOW DO YOU KNOW?

IN WHAT FORM DID THE FOOD HAVE ENERGY?

If a student has observed the explosion and made the connection that food has energy, explain why (see Appendix A for content explanation at beginning of Core Curriculum).

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-9

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Students:

--respond, "To find out if there is energy in food."

--relate the explosion to a sudden release of energy and infer that the food had energy.

--respond, "Yes."

--respond, "The lid blew off," "It blew up," "The lid moved," "It exploded."

--respond, "It was stored," or perhaps "Chemical."

ACTIVITY 3-9

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MATERIALS

TEACHING STRATEGIES

If there are students who question "yellow flour" as really being food, refer to the explanation of lycopodium (pronounced lye-kuh-p6-dee-um) spores (what they are and how they represent food) in the content explanation of Core B.

Introduce the experimental portion of this activity by saying:

ON THE TABLE ARE SOME FOODS AND OTHER MATERIALS.  
USE ANY OF THESE MATERIALS YOU WANT AND SEE IF  
YOU CAN SHOW THAT FOOD HAS ENERGY STORED IN IT.

The pinwheels, matches, etc., will suggest burning the foods. Allow the students ample time for experimenting. Give no further direction to the class as a whole.

That food has energy may be demonstrated in a variety of ways. Some students may simply ignite the food and measure the heat given off. Others may state that the light given off during burning indicates the release, and hence presence of energy. If students do only this it indicates a recognition or identification of energy, but does not fulfill the demonstration of the "work" criterion for energy. A more complete understanding is established if the student demonstrates and explains that heat from burning food caused the pinwheel to turn.

LOTS OF  
WORK TIME

After students have had ample opportunity to experiment, ask:

WHAT DID YOU LEARN ABOUT FOODS AND ENERGY?

## TEACHING STRATEGIES

students who question "yellow flour" as really refer to the explanation of lycopodium (eye-kuh-pō-dee-um) spores (what they are and present food) in the content explanation of

experimental portion of this activity by

TABLE ARE SOME FOODS AND OTHER MATERIALS.  
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caused the pinwheel to turn.

LOTS OF  
WORK TIME

s have had ample opportunity to experiment,

YOU LEARN ABOUT FOODS AND ENERGY?

## ANTICIPATED STUDENT BEHAVIORS

Students:

--design and perform an experiment which will  
demonstrate that food contains energy.

--reply, "They burned," "They caught on fire,"  
"They made the pinwheel turn," "They made the  
wheel work," "Food has energy."

## MATERIALS

## TEACHING STRATEGIES

WHAT HAPPENED WHEN YOU LIT THE FOODS WITH A MATCH?

DID THE FOODS BURNED GIVE OFF ANY ENERGY?

HOW DO YOU KNOW?

WHAT DID THE ENERGY DO?

Then ask:

WHAT ARE SOME OF THE THINGS WE DO THAT CAUSE OUR BODIES TO USE ENERGY?

WHERE DO WE GET THE ENERGY?

WHAT HAPPENS WHEN WE ARE SLEEPING OR RESTING? DO WE USE ENERGY THEN?

Conclude the activity by saying:

THIS IS SOMETHING WE WILL TEST IN THE NEXT ACTIVITY.

## TEACHING STRATEGIES

HAPPENED WHEN YOU LIT THE FOODS WITH A

?

THE FOODS BURNED GIVE OFF ANY ENERGY?

DO YOU KNOW?

DID THE ENERGY DO?

ARE SOME OF THE THINGS WE DO THAT CAUSE  
BODIES TO USE ENERGY?

DO WE GET THE ENERGY?

HAPPENS WHEN WE ARE SLEEPING OR RESTING?  
USE ENERGY THEN?

he activity by saying:

IS SOMETHING WE WILL TEST IN THE NEXT  
ITY.

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-9

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Students:

--respond, "They burned," "Got black."

--infer that foods gave off energy.

--respond, "They burned," "Made the wheel turn,"  
"They gave off heat and light."

--respond, "It turned the pinwheel or radiometer."

--list activities they perform, such as running,  
walking, dancing, working, etc.

--identify food as their source of "go power."

--respond, "Yes," "Maybe," "I don't know."

UNIT III, CORE B  
ACTIVITY 3-9: "Energy In Food"

Activity name suggested by class: \_\_\_\_\_

Teacher

BSCS USE:	Post	Tally	Rev		
Day 1	Day 2	Day 3	Day 4	Day 5	Day 6

1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes of preparation each day						
4.	Students absent on each date (Use ID Number)						

5. Interest of class as expressed by apparent attention to what is happening.Number of students responding with: \_\_\_\_\_ Name students you noted especially: \_\_\_\_\_  
(Number)

HIGH INTEREST	_____
MODERATE INTEREST	_____
INDIFFERENCE	_____
MODERATE RESISTANCE	_____
STRONG DISLIKE	_____
HARD TO RATE	_____

6. Equipment in kit: ☐ None ☐ Satisfactory ☐ Too fragile complicated to use ☐ Difficult to use
7. Equipment I got: ☐ None ☐ Easy to get but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

Materials used:	Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:
10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:
11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:
12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?
13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:
14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:
15. Your rating of this activity:  
☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless  
-----keep as is----- revision suggested major changes described -----drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

29670

ERIC  
Full Text Provided by ERIC

1

Maturity level is	<input type="checkbox"/> just right	<input type="checkbox"/> too childish	<input type="checkbox"/> too mature	Explain:
Vocabulary level is	<input type="checkbox"/> just right	<input type="checkbox"/> too easy	<input type="checkbox"/> too difficult	Explain:
Were teacher instructions clear enough to follow?				<input type="checkbox"/> Yes <input type="checkbox"/> No -Pages and Problem:

15. Your rating of this activity:
- |                                     |   |  |  |
|-------------------------------------|---|--|--|
| <input type="checkbox"/> Worthwhile | <input type="checkbox"/> Of value--needs the revision suggested | <input type="checkbox"/> Worth salvaging--make major changes described | <input type="checkbox"/> Worthless --drop it |
|-------------------------------------|---|--|--|
- 
- SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

---

**Messages for staff (read immediately):**

**SIDE A**

UNIT III, CORE B  
ACTIVITY 3-9: "Energy In Food"

Teacher \_\_\_\_\_

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- |  |  |
|--|--|
| <input type="checkbox"/> how you organized materials or class.   | <input type="checkbox"/> who had problems and what they were.            |
| <input type="checkbox"/> things added (a question, a picture, etc.).   | <input type="checkbox"/> how someone "caught on" (or who never did).     |
| <input type="checkbox"/> equipment, supplies, visual aids.   | <input type="checkbox"/> who was really "turned off" (or on).            |
| <input type="checkbox"/> things that went wrong, misunderstandings.  | <input type="checkbox"/> reactions of parents, teachers, students.       |
| <input type="checkbox"/> what you would do differently or avoid next time.   | <input type="checkbox"/> special evidence of learning or applying ideas. |
| <input type="checkbox"/> turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them. |  |

THE STUDENTS





## Me and my Environment

### OBJECTIVE FOCUS FOR THIS ACTIVITY

#### UNIT GOALS:

1. Realize and appreciate the energy inter-relationships between organisms.

#### CORE B OBJECTIVES:

2. Appreciate that being alive is a dynamic state requiring energy.
4. Determine that increased activity requires an increased amount of energy.

### MATERIALS

\*Paper towels or sponges

\*Masking tape

\*3 Containers per group of 4 students (2- or 3-pound coffee cans, 1/2-gallon milk cartons, or something similar)

(Continued on next page)

\*Not furnished in materials kit

### TEACHING STRATEGIES

#### Activity 3-10. It Takes Energy To Live

*This activity will concern itself with the solution of the problem posed at the end of the previous activity: "Do we use energy when asleep or resting?" This activity will demonstrate that the state of being alive is an energy-consuming activity and that when energy is used by the body, some of it is released in the form of heat. That increased activity increases the demand for energy will also be illustrated.*

#### Teacher Preparation:

1. Have ice cubes available for lowering the temperature of tap water.
2. Paper towels or sponges should be available to wipe up water spills.

## FOCUS FOR THIS ACTIVITY

### GOALS:

1. Realize and appreciate the energy inter-relationships between organisms.

### OBJECTIVES:

2. Appreciate that being alive is a dynamic state requiring energy.
4. Determine that increased activity requires an increased amount of energy.

## TEACHING STRATEGIES

### 3-10. It Takes Energy To Live

Activity will concern itself with the solution of the problem posed at the end of the previous activity: "Does the body use energy when asleep or resting?" This activity will demonstrate that the state of being alive is an energy-consuming activity and that when energy is used, some of it is released in the form of heat. Increased activity increases the demand for energy and this will be illustrated.

### Preparation:

Ice cubes available for lowering the temperature of tap water.

Paper towels or sponges should be available to clean up water spills.

### UNIT III.

### ENERGY RELATIONSHIPS IN MY ENVIRONMENT

### CORE B.

### ENERGY IN FOOD



**BSCS**

### ACTIVITY 3-10. IT TAKES ENERGY TO LIVE

## ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

- have supported or changed his ideas about using energy when sleeping or resting.
- have performed his assigned portion of the temperature experiment.
- have completed Worksheets 3-10 and 3-11.
- have explained that the temperature increased in containers C and B because the body gives off heat energy, but that an actively moving hand gives off more heat.
- have said either that the body gives off heat while resting or that the experiment hasn't answered the question.

ACTIVITY 3-10

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MATERIALS

3 Metal-backed thermometers per group of 4 students

\*Ice

\*Timer, clock, or watch with second hand

Thermometer, demonstration model

\*Felt tip pens (black, green, red)

Worksheet 3-10

Slide 3-19

Worksheet 3-11

Slide 3-20

\*35mm Slide projector

TEACHING STRATEGIES

Begin by stating:

WE ENDED OUR LAST ACTIVITY BY ASKING, "DO WE USE ENERGY WHEN WE ARE ASLEEP OR RESTING?" HOW MANY THINK WE DO? HOW MANY THINK WE DON'T?

HOW DO WE KNOW A CANDLE RELEASES ENERGY?

HOW DO WE KNOW A STOVE RELEASES ENERGY?

HOW COULD WE TELL IF OUR BODY RELEASES ENERGY?

HOW COULD WE TELL IF OUR BODY GIVES OFF HEAT?

Now say:

LET'S PERFORM AN EXPERIMENT TO SEE IF OUR BODY GIVES OFF ENERGY WHILE WE REST. TO DO THIS, THOUGH, WE MUST BE SURE WE CAN CORRECTLY USE AND READ A THERMOMETER.

Instruction in the use of the thermometer is introduced in Unit I, Core B, Activities 1-19 and 1-20. In most cases the thermometer exercises here will be a review.

Display the thermometer demonstration model. By indicating different temperatures on the model, allow each student to practice reading temperatures.

Distribute the student thermometers. Circulate about the room asking each student to read to you the temperature on the thermometer. Have each student hold the bulb between thumb and forefinger and read again. This provides additional practice and an opportunity for the students to see how their data can be affected if the thermometers are not handled properly.

\*Not furnished in materials kit

## TEACHING STRATEGIES

ting:

END OUR LAST ACTIVITY BY ASKING, "DO WE USE  
WHEN WE ARE ASLEEP OR RESTING?" HOW MANY  
DO? HOW MANY THINK WE DON'T?

DO WE KNOW A CANDLE RELEASES ENERGY?

DO WE KNOW A STOVE RELEASES ENERGY?

SHOULD WE TELL IF OUR BODY RELEASES ENERGY?

SHOULD WE TELL IF OUR BODY GIVES OFF HEAT?

PERFORM AN EXPERIMENT TO SEE IF OUR BODY  
GIVES OFF ENERGY WHILE WE REST. TO DO THIS, THOUGH,  
WE MUST BE SURE WE CAN CORRECTLY USE AND READ A  
THERMOMETER.

When the use of the thermometer is introduced  
in Core B, Activities 1-19 and 1-20. In most  
thermometer exercises here will be a review.

thermometer demonstration model. By indicating  
temperatures on the model, allow each student to  
reading temperatures.

Use the student thermometers. Circulate about  
allowing each student to read to you the temperature  
on the thermometer. Have each student hold the bulb  
between the thumb and forefinger and read again. This provides  
practice and an opportunity for the students  
to see how their data can be affected if the thermometers  
are not used properly.

## ANTICIPATED STUDENT BEHAVIORS

Students:

--signify their opinions by raising hands.

--recall, "It gives off heat," "It gives off light."

--respond, "It gives off heat."

--infer, "It uses energy if it gives off heat."

--respond, "Measure our temperature."

--read thermometer temperatures on model.


--read temperatures on their own thermometers.

## MATERIALS

Slide 3-19

Worksheet 3-10

Date \_\_\_\_\_ Name \_\_\_\_\_



Minutes	Temperature of water		
	No hand	Quiet hand	Moving hand
0			
2			
4			
6			

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## TEACHING STRATEGIES

Divide the class into teams of four (three thermometer readers and one hand mover). Briefly explain to the teams what they will be doing by saying:

IN THIS EXPERIMENT WE'RE GOING TO PUT WATER IN SOME CONTAINERS, PUT OUR HANDS IN THE WATER, AND WITH THE HELP OF OUR THERMOMETERS, OBSERVE ANY CHANGES THAT MAY TAKE PLACE.

Distribute Worksheet 3-10, materials, and project Slide 3-19 of the worksheet. Using only one set of materials, explain and, with four students, carry out the following procedures:

1. Label the three containers "no hand," "quiet hand," and "moving hand."
2. Fill each of the containers one-half full of tap water. Make sure all the containers are filled with equal amounts of water.
3. Tape a thermometer in position with transparent tape so that the bulb is under the water.
4. Place ice in each container until the temperature drops to 55° F.
5. Remove all ice when the water drops to 55°.

When the three containers are ready, select four students to demonstrate the experimental tasks.

Ask:

WHAT IS THE TEMPERATURE IN EACH OF THE CONTAINERS?

## TEACHING STRATEGIES

class into teams of four (three thermometer one hand mover). Briefly explain to the teams all be doing by saying:

EXPERIMENT WE'RE GOING TO PUT WATER IN CONTAINERS, PUT OUR HANDS IN THE WATER, AND THE HELP OF OUR THERMOMETERS, OBSERVE ANY THAT MAY TAKE PLACE.

Worksheet 3-10, materials, and project Slide worksheet. Using only one set of materials, with four students, carry out the following

the three containers "no hand," "quiet hand," moving hand."

each of the containers one-half full of tap Make sure all the containers are filled equal amounts of water.

a thermometer in position with transparent so that the bulb is under the water.

ice in each container until the temperature to 55° F.

all ice when the water drops to 55°.

ree containers are ready, select four students ate the experimental tasks.

THE TEMPERATURE IN EACH OF THE CONTAINERS?

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-10

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Students:

--read correctly the thermometer in each container and state the temperature.

## MATERIALS

## TEACHING STRATEGIES

Check any discrepancies in temperature that may have occurred. If necessary, add more ice or warm water so that the water in each container is 55° F. Record the beginning temperatures on the board.

Give the following directions to the students selected to demonstrate:

(First student's name), PLACE ONE HAND IN THE "QUIET-HAND" CONTAINER AND YOUR OTHER HAND IN THE "MOVING-HAND" CONTAINER. KEEP ONE HAND PERFECTLY STILL AS IF YOU WERE IN A DEEP SLEEP, BUT AT THE SAME TIME MOVE THE FINGERS ON YOUR OTHER HAND CONSTANTLY AND RAPIDLY. KEEP BOTH HANDS COMPLETELY UNDER WATER.

(Second student's name), WATCH CAREFULLY THE THERMOMETER IN THE CONTAINER WITH THE MOVING HAND. READ THE TEMPERATURE WHEN I TELL YOU THAT TWO MINUTES ARE UP, AND AGAIN AT FOUR AND AT SIX MINUTES. RECORD THE TEMPERATURES ON YOUR WORKSHEET.

(Third student's name), WATCH THE THERMOMETER IN THE CONTAINER WITH THE QUIET HAND. READ THE TEMPERATURE AFTER TWO MINUTES AND AGAIN AFTER FOUR AND AFTER SIX MINUTES. RECORD THE TEMPERATURES ON YOUR WORKSHEET.

(Fourth student's name), AFTER TWO MINUTES, AND AGAIN AFTER FOUR AND AFTER SIX MINUTES, READ THE TEMPERATURE IN THE CONTAINER THAT HAS ONLY WATER IN IT. RECORD THE TEMPERATURES ON YOUR WORKSHEET.

When two minutes have passed, tell those appointed to read the thermometers that they should read the temperatures. It has been advised that the thermometers be taped to the inside of the can. If, however, the thermometer must be removed from the water to be read, instruct the

## TEACHING STRATEGIES

discrepancies in temperature that may have  
If necessary, add more ice or warm water so  
water in each container is 55° F. Record the  
temperatures on the board.

Following directions to the students selected to  
be:

(student's name), PLACE ONE HAND IN THE  
"QUIET-HAND" CONTAINER AND YOUR OTHER HAND IN  
"MOVING-HAND" CONTAINER. KEEP ONE HAND  
STILL AS IF YOU WERE IN A DEEP SLEEP,  
AT THE SAME TIME MOVE THE FINGERS ON YOUR  
HAND CONSTANTLY AND RAPIDLY. KEEP BOTH  
COMPLETELY UNDER WATER.

(student's name), WATCH CAREFULLY THE  
THERMOMETER IN THE CONTAINER WITH THE MOVING  
HAND. READ THE TEMPERATURE WHEN I TELL YOU  
TWO MINUTES ARE UP, AND AGAIN AT FOUR  
AND SIX MINUTES. RECORD THE TEMPERATURES  
ON YOUR WORKSHEET.

(student's name), WATCH THE THERMOMETER  
IN THE "QUIET-HAND" CONTAINER WITH THE QUIET HAND. READ  
THE TEMPERATURE AFTER TWO MINUTES AND AGAIN  
AT FOUR AND AFTER SIX MINUTES. RECORD THE  
TEMPERATURES ON YOUR WORKSHEET.

(student's name), AFTER TWO MINUTES, AND  
AFTER FOUR AND AFTER SIX MINUTES, READ THE  
TEMPERATURE IN THE CONTAINER THAT HAS ONLY  
ICE IN IT. RECORD THE TEMPERATURES ON YOUR  
WORKSHEET.

After the minutes have passed, tell those appointed to  
read the thermometers that they should read the tempera-  
ture. It has been advised that the thermometers be taped  
to the side of the can. If, however, the thermometer  
is moved from the water to be read, instruct the

## ANTICIPATED STUDENT BEHAVIORS



## MATERIALS

## TEACHING STRATEGIES

students to do so quickly and then return the thermometer to the water. Explain that the thermometer must be read quickly. If the thermometer is removed from the water for very long, the temperature will change because the air is warmer than the water.

Demonstrate how to record the temperatures by doing so on the projected worksheet. Have the students again read the temperatures after four minutes and after six minutes. Again record the results. This initial activity by one group of students is to familiarize the class with the procedure to be followed and to provide additional practice in reading the thermometers.

Ask:

WHY DIDN'T WE PUT ANYTHING INTO THE WATER  
IN THIS CONTAINER? (Point to "no-hand"  
container.)

If students do not recognize the purpose of the "no-hand" container tell them that it serves as a comparison--to determine if any change occurs with no hand in the water.

Now ask:

WHAT ARE WE TRYING TO FIND OUT BY DOING THIS  
EXPERIMENT?

Students may not recognize the purpose of the experiment at this point. If not, repeat the question strategy at the beginning of this activity.

Now repeat the entire experiment with all teams participating. Instruct those reading the thermometers to record

## TEACHING STRATEGIES

to do so quickly and then return the thermometer  
er. Explain that the thermometer must be read  
if the thermometer is removed from the water for  
the temperature will change because the air is  
in the water.

te how to record the temperatures by doing so  
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rd the results. This initial activity by one  
students is to familiarize the class with the  
to be followed and to provide additional practice  
the thermometers.

WIDN'T WE PUT ANYTHING INTO THE WATER  
IS CONTAINER? (Point to "no-hand"  
iner.)

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tell them that it serves as a comparison--to  
if any change occurs with no hand in the water.

ARE WE TRYING TO FIND OUT BY DOING THIS  
IMENT?

ay not recognize the purpose of the experiment  
int. If not, repeat the question strategy at  
ing of this activity.

the entire experiment with all teams partici-  
nstruct those reading the thermometers to record

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-10

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Students:

--suggest that this container is for comparison  
purposes to see if the water temperature changes  
with nothing in it.

--conclude that they are experimenting to see if  
their bodies give off energy when they are not  
moving, while they sleep.

ACTIVITY 3-10

88

MATERIALS

TEACHING STRATEGIES

the temperatures on their worksheets. Give the signal every two minutes for temperatures to be read and recorded. Be sure to add ice until the water in all three containers is again brought down to 55°, after which remove the ice. Be sure also that beginning temperatures are recorded.

When all the readings have been taken, make sure each student completes his worksheet to have a record of temperatures in all three containers at each time period. Then ask:

WHICH CONTAINER HAS THE MOST HEAT ENERGY NOW?

HOW DO YOU KNOW?

WHERE DID THE HEAT ENERGY COME FROM?

DID THE TEMPERATURE GO UP IN THE CONTAINER WITH THE QUIET HAND?

WHY?

Some students may indicate that the quiet hand felt the coldest and therefore must have given off the most energy. Explain that since we don't use as much energy when we are resting not enough energy was being used to keep it warm.

WHICH HAND GAVE OFF THE MOST HEAT ENERGY?

WHY DID THE TEMPERATURE IN THE CONTAINER WITH THE MOVING HAND CHANGE THE MOST?

WHAT DID THE HAND USE WHEN IT WAS MOVING?

DID THE TEMPERATURE IN THE "NO-HAND" CONTAINER CHANGE?

## TEACHING STRATEGIES

tures on their worksheets. Give the signal  
minutes for temperatures to be read and recorded.  
Add ice until the water in all three containers  
cooled down to 55°, after which remove the ice.  
At that beginning temperatures are recorded.

After readings have been taken, make sure each  
student completes his worksheet to have a record of  
temperatures in all three containers at each time period.

WHICH CONTAINER HAS THE MOST HEAT ENERGY NOW?

DO YOU KNOW?

FROM WHERE DID THE HEAT ENERGY COME FROM?

WHICH TEMPERATURE GO UP IN THE CONTAINER WITH  
THE MOVING HAND?

Students may indicate that the quiet hand felt the  
heat, therefore must have given off the most energy.  
However, since we don't use as much energy when we are  
resting, enough energy was being used to keep it warm.

WHICH HAND GAVE OFF THE MOST HEAT ENERGY?

WHICH TEMPERATURE IN THE CONTAINER  
WITH THE MOVING HAND CHANGE THE MOST?

WHICH HAND USE WHEN IT WAS MOVING?

WHICH TEMPERATURE IN THE "NO-HAND" CONTAINER

## ANTICIPATED STUDENT BEHAVIORS

Students:

--conclude that the "moving-hand" container has the  
most heat energy.

--respond, "It has the highest temperature."

--respond, "The hand," "Moving the hand."

--respond, "Yes."

--infer that a resting hand also gives off energy.

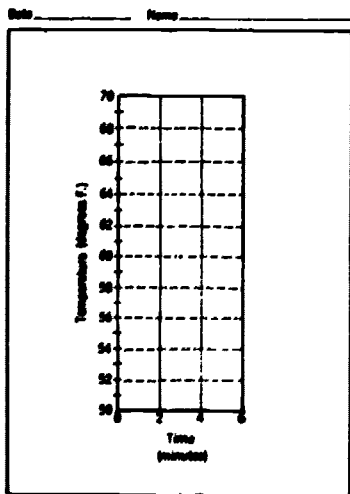
--respond, "The right hand," "The working hand."

--infer that it takes energy to move something,  
and the more movement, the more energy released.

--conclude that when energy is used by the body,  
some of it is released in the form of heat.

--respond, "Yes."

## MATERIALS



Slide 3-20

Worksheet 3-11

## TEACHING STRATEGIES

WHERE DID ITS HEAT ENERGY COME FROM?

WHAT WAS THE MAIN CAUSE OF THE TEMPERATURE CHANGE IN THE CONTAINERS WITH THE HANDS?

DO WE RELEASE ENERGY WHEN WE ARE RESTING AND ASLEEP?

If students respond with "no," have a student sit or lie perfectly still and ask:

IS (student's name) USING ENERGY?

HOW DO YOU KNOW WE RELEASE ENERGY WHEN WE ARE RESTING OR ASLEEP?

Now ask:

DOES ANYONE REMEMBER HOW WE CAN SHOW INFORMATION WITHOUT WRITING WORDS?

If not, say:

TO SEE WHAT HAS HAPPENED IN THE CONTAINERS WE ARE GOING TO MAKE A GRAPH.

Distribute Worksheet 3-11, project Slide 3-20 and ask:

WHAT WAS THE TEMPERATURE OF THE WATER IN THE "NO-HAND" CONTAINER WHEN WE STARTED?

## TEACHING STRATEGIES

WAS THE MAIN CAUSE OF THE TEMPERATURE CHANGE IN THE CONTAINERS WITH THE HANDS?

DO YOU KNOW WE RELEASE ENERGY WHEN WE ARE RESTING AND ASLEEP?

IF NOT, SAY:

STUDENT'S NAME) USING ENERGY?

ANYONE REMEMBER HOW WE CAN SHOW INFORMATION WITHOUT WRITING WORDS?

TO SEE WHAT HAS HAPPENED IN THE CONTAINERS WE ARE GOING TO MAKE A GRAPH.

Worksheet 3-11, project Slide 3-20 and ask:

WAS THE TEMPERATURE OF THE WATER IN THE "RESTING" CONTAINER WHEN WE STARTED?

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-10

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Students:

--infer from the air, from the room.

--respond, "My hands," "My hands are warm."

--infer that we do release energy when resting; that the body uses energy just to stay alive.

--infer, "Yes." Even when a person is lying perfectly still the chest will still be moving slightly as a result of breathing, or the pulse can be felt and his body will continue to give off heat.

--associate the resting hand in the experiment with resting and conclude that we use energy when at rest.

--recall, "Make a graph."

--read from worksheet or recall beginning temperature.

ACTIVITY 3-10

90

MATERIALS

TEACHING STRATEGIES

WHO CAN SHOW US WHERE TO MARK THE STARTING TEMPERATURE ON THE GRAPH?

Place a dot at the correct temperature on the projected graph. Direct students to place a dot at the same location on their worksheets. Check individual graphs and help those who are having problems.

Now ask:

WHAT WAS THE TEMPERATURE IN THE "NO-HAND" CONTAINER AFTER TWO MINUTES? FOUR MINUTES? SIX MINUTES?

This time have the students refer to their own data for the appropriate temperature to put on the graph.

When the appropriate dots have been placed on the graphs, have the students connect the points using a black felt tip pen or soft lead pencil. Label the line "no hand".

Ask your best student to repeat the demonstration of how points are placed on the graph using the data from the "quiet-hand" container. Instruct students to connect dots using a green pen or marker. Label this line "quiet hand".

Without demonstrating, have students graph data for the "moving-hand" container, using a red marker to connect the dots. Label this line "moving hand". Individual help may be necessary.

CLUES TO SUCCESS

GRAPH CONSTRUCTION T

## TEACHING STRATEGIES

SHOW US WHERE TO MARK THE STARTING  
TEMPERATURE ON THE GRAPH?

at the correct temperature on the projected  
ect students to place a dot at the same  
their worksheets. Check individual graphs  
ose who are having problems.

AS THE TEMPERATURE IN THE "NO-HAND" CONTAINER  
TWO MINUTES? FOUR MINUTES? SIX MINUTES?

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soft lead pencil. Label the line "no hand".

st student to repeat the demonstration of how  
placed on the graph using the data from the  
" container. Instruct students to connect dots  
en pen or marker. Label this line "quiet

onstrating, have students graph data for the  
d" container, sing a red marker to connect  
Label this line "moving hand". Individual  
necessary.

## ANTICIPATED STUDENT BEHAVIORS

Students:

--locate the appropriate coordinates.

--place dots on graph at correct location.

--state correct temperatures.

CLUES **TO** SUCCESS



GRAPH  
CONSTRUCTION TIME



## MATERIALS

## TEACHING STRATEGIES

When graphs have been completed, ask:

IN WHICH DIRECTION DO OUR LINES GO?

WHAT DOES THAT TELL US ABOUT WHAT HAS HAPPENED  
TO THE TEMPERATURE OF THE WATER IN THE CONTAINERS?

DID IT GO UP IN ALL THREE CONTAINERS WHEN WE  
MEASURED IT AT THE DIFFERENT TIMES?

DID THE TEMPERATURE GO UP THE SAME NUMBER OF  
DEGREES IN ALL THE CONTAINERS?

WHY DIDN'T THEY ALL GO UP THE SAME?

WHICH OF THE LINES ON OUR GRAPH SHOWS US IN  
WHICH CONTAINER THE TEMPERATURE WENT UP THE  
MOST?

WHY DID THE TEMPERATURE GO UP THE MOST IN THIS  
CONTAINER?

WHY DID THE MOVING HAND CAUSE THE TEMPERATURE  
TO GO UP MOST?

Collect the data recorded and graphs (Worksheets 3-10 and 3-11), and keep them together by the teams in which they worked so that you can compare their papers when you complete Tallysheet 3-5.

## TEACHING STRATEGIES

ns have been completed, ask:

WHICH DIRECTION DO OUR LINES GO?

DOES THAT TELL US ABOUT WHAT HAS HAPPENED  
THE TEMPERATURE OF THE WATER IN THE CONTAINERS?

IT GO UP IN ALL THREE CONTAINERS WHEN WE  
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H CONTAINER THE TEMPERATURE WENT UP THE  
?

DID THE TEMPERATURE GO UP THE MOST IN THIS  
AINER?

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O UP MOST?

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d keep them together by the teams in which they  
that you can compare their papers when you  
Tallysheet 3-5.

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-10

9!

Students:

--respond, "Up."

--infer that the temperature has gone up.

--respond, "Yes." (All three should show  
increases, although the "no-hand" container  
should show only a slight increase.)

--respond, "No."

--respond, "They didn't all have the same energy."

--signify the top line, or the green line.

--respond, "Because the hand was moving."

--reply, "It had more energy," "It gave off more  
energy."

UNIT III, CORE B  
TALLY SHEET 3-5: Tabulation of Worksheet 3-11  
ACTIVITY 3-10: "It Takes Energy To Live"

**Column 1: Graphing the Data.** Sort out student worksheets by the teams in which they worked as the data recorded by each team will differ. Compare the graphs of the no-hand temperature of the four students in each team and notice if they are identical. If any student has incorrectly graphed the data, make a check in the Error column below. If graphing is accurate check the OK column. You may need to refer to Worksheet 3-10 to verify the temperatures that were recorded. This will indicate whether each student understood what was to be done and was able to follow directions to graph the information.

**Column 2: Graphing On Own.** Look at each student's graph of the moving-hand temperatures. Compare what was graphed with what the group recorded. If correctly graphed, check the OK column. If the entry is on the wrong temperature or time line, check temp. or time (or both). If there is some other problem with this graph, briefly explain in the Other Problem column. This will tell you whether students understand how to graph and, if not, what problems need to be worked on.

[illegible]

[illegible]

**TOTALS:**

Does this summary give an accurate indication of each student's understanding of graphing?

☐ Yes ☐ No

**If not, what other evidence do you have, and which students are affected?**

UNIT III, CORE B  
ACTIVITY 3-10: "It Takes Energy To Live"

Activity name suggested by class: \_\_\_\_\_

Teacher

BSCS USE:	Post	Tally	Rev		
Day 1	Day 2	Day 3	Day 4	Day 5	Day 6

1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes of preparation each day						
4.	Students absent on each date (Use ID Number)						

5. Interest of class as expressed by apparent attention to what is happening.Number of students responding with: \_\_\_\_\_ Name students you noted especially: \_\_\_\_\_  
(Number)

HIGH INTEREST	_____
MODERATE INTEREST	_____
INDIFFERENCE	_____
MODERATE RESISTANCE	_____
STRONG DISLIKE	_____
HARD TO RATE	_____

6. Equipment in kit: ☐ None needed ☐ Satisfactory ☐ Too fragile complicated to use ☐ Too difficult to use
7. Equipment I got: ☐ None needed to get ☐ Easy to get but okay add to kit ☐ Hard to get, add to kit ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:	Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:
10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:
11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:
12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?
13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:
14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:
15. Your rating of this activity: ☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless  
--keep as is revision suggested major changes described --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

Equipment I got: ☐ None ☐ Easy ☐ Hard to get, ☐ Hard to get, ☐ Unobtainable,  
needed to get but okay add to kit add to kit

Materials used:	Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:
10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:
11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:
12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?
13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:
14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:
15. Your rating of this activity:  
☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless  
--keep as is revision suggested major changes described --drop it  
-----

## SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed.  
What parts of this activity should be retained when the curriculum is revised?  
Page(s) \_\_\_\_\_;

17. Did students have difficulty taking temperatures accurately and recording them correctly on Worksheet 3-10?  
☐ No ☐ Yes: Comment.

18. Were any students confused by the three graphs on one sheet?  
☐ No ☐ Yes: Comment.

19. Please complete Tallysheet 3-5 of Worksheet 3-11 and send in with this feedback sheet.

20. Concern (or questions) about content:

21. Messages for staff (read immediately):

BSCS Evaluation: EMH Feedback Form 1c

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

UNIT III, CORE B  
ACTIVITY 3-10: "It Takes Energy To Live"

Teacher \_\_\_\_\_

## REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

## THE LESSON

## THE STUDENTS

- |  |  |
|--|--|
| <input type="checkbox"/> how you organized materials or class.   | <input type="checkbox"/> who had problems and what they were.            |
| <input type="checkbox"/> things added (a question, a picture, etc.).   | <input type="checkbox"/> how someone "caught on" (or who never did).     |
| <input type="checkbox"/> equipment, supplies, visual aids.   | <input type="checkbox"/> who was really "turned off" (or on).            |
| <input type="checkbox"/> things that went wrong, misunderstandings.  | <input type="checkbox"/> reactions of parents, teachers, students.       |
| <input type="checkbox"/> what you would do differently or avoid next time.   | <input type="checkbox"/> special evidence of learning or applying ideas. |
| <input type="checkbox"/> turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them. |  |



## Me and my Environment

### OBJECTIVE FOCUS FOR THIS ACTIVITY

#### UNIT GOALS:

1. Realize and appreciate the energy inter-relationships between organisms.

#### CORE B OBJECTIVES:

3. Determine that different foods have different amounts of energy.

### MATERIALS

- 1 Equal-arm balance kit/group
- \*Objects to weigh (paper clips, pennies, other coins, erasers, life savers, pencils, rubber stoppers, ping pong balls, popped popcorn, styrofoam balls, marbles, dried peas and beans, wooden and rubber balls, etc.)
- \*Pliers or strong scissors
- \*Felt tip pens

\*Not furnished in materials kit

### TEACHING STRATEGIES

#### Activity 3-11. Measuring With A Balance

*In this activity the students will be introduced to a simple balance and given the opportunity to develop some degree of skill in using it. This skill is necessary in order to weigh equal portions of food in Activity 3-12. Later activities in this program will also require the use of a balance.*

#### Teacher Preparation:

Proper care of the balance and bead sets will avoid future problems. It is important to use the same balance with the same set of beads throughout the year; therefore you should number the balances and bead sets. Discourage bead swapping since beads in the same string have nearly the same mass but beads in other chains may differ. Be sure to cut each set from the same string.

To be sure that the balances are working properly, check the following for each balance before class:

1. With both pans empty see that:
  - a. The sliding weight on the right-hand arm of the balance beam is as close to the center as it can go.



**FOCUS FOR THIS ACTIVITY**

**GOALS:**

Realize and appreciate the energy inter-relationships between organisms.

**OBJECTIVES:**

Determine that different foods have different amounts of energy.

**UNIT III.**

**ENERGY RELATIONSHIPS  
IN MY ENVIRONMENT**

**CORE B.**

**ENERGY IN FOOD**

**ACTIVITY 3-11.**

**MEASURING WITH A  
BALANCE**



**BSCS**

**TEACHING STRATEGIES**

**1. Measuring With A Balance**

With the students will be introduced to a balance and given the opportunity to develop some skill in using it. This skill is necessary in weighing equal portions of food in Activity 3-12. Activities in this program will also require the use of a balance.

**Preparation:**

Each of the balance and bead sets will avoid problems. It is important to use the same balance and the same set of beads throughout the year; therefore, label and number the balances and bead sets. Do not swap beads since beads in the same string have the same mass but beads in other chains may vary. Be sure to cut each set from the same string.

Before class, check that the balances are working properly, check the balance beam for each balance before class:

With both pans empty see that:

The sliding weight on the right-hand arm of the balance beam is as close to the center as it can go.

**ANTICIPATED STUDENT BEHAVIORS**

*At the end of this activity, each student should:*

- have weighed and recorded accurately a variety of objects, using the equal-arm balance.
- have observed that objects which vary in volume may have the same, or very nearly the same, weight.

## MATERIALS

## TEACHING STRATEGIES

- b. Move the sliding weights on each arm of the balance beam so that the pointer swings freely equal distances on either side of the pointer scale. (The pointer does not have to stop at zero; only swing equal distances on either side.)

When the above two conditions are met, the scale is properly balanced.

2. If the pointer does not swing equal distances, adjust the sliding weight on the left-hand arm of the beam. If it still does not balance try switching balance pans. (Mark the pans "L" and "R" with a permanent felt marking pen so the students will always use the pans on the correct sides.)
3. If any pointer still does not balance it may be necessary to add a piece of masking tape or rubber band to one beam arm in order to get a zero balance.
4. The zero setting should be checked each day the balance is used since handling or an uneven table top will require changing the position of the zero adjusting sliding weight.
5. Cut the bead chains to proper lengths with pliers or strong scissors. Use care in cutting so that the short metal pin connecting one bead to another is cut as close to the center as possible. (Hang the string from one end and cut while hanging.)
6. A set of beads of the following chain lengths is convenient to use:
  - 1 chain of 100 beads
  - 1 chain of 50 beads
  - 2 chains of 20 beads
  - 1 chain of 10 beads

### TEACHING STRATEGIES

Move the sliding weights on each arm of the balance beam so that the pointer swings freely equal distances on either side of the pointer scale. (The pointer does not have to stop at zero, only swing equal distances on either side.)

When the above two conditions are met, the scale is properly balanced.

If the pointer does not swing equal distances, move the sliding weight on the left-hand arm of the beam. If it still does not balance try adjusting the balance pans. (Mark the pans "L" and "R" with a permanent felt marking pen so the students always use the pans on the correct sides.)

If the pointer still does not balance it may be necessary to add a piece of masking tape or rubber to one beam arm in order to get a zero.

The zero setting should be checked each day the scale is used since handling or an uneven table may require changing the position of the adjusting sliding weight.

Adjust the bead chains to proper lengths with pliers or side cutters. Use care in cutting so that the metal pin connecting one bead to another is as close to the center as possible. (Hang the chain from one end and cut while hanging.)

A set of beads of the following chain lengths is recommended to use:

- 1 of 100 beads
- 1 of 50 beads
- 1 of 20 beads
- 1 of 10 beads

### ANTICIPATED STUDENT BEHAVIORS

## MATERIALS

## TEACHING STRATEGIES

1 chain of 5 beads  
2 chains of 2 beads  
5 single beads

Begin the activity period by saying:

IN ORDER FOR SCIENTISTS TO DO EXPERIMENTS PROPERLY THEY OFTEN NEED TO WEIGH SOME OF THE MATERIALS THEY WILL BE EXPERIMENTING WITH. SINCE WE WILL BE DOING SOME EXPERIMENTS WHERE IT IS NECESSARY TO WEIGH THINGS, WE MUST LEARN TO USE A BALANCE CORRECTLY.

Divide the students into groups of three. Distribute equal-arm balance kits to each group.

Allow students to use the scales to weigh things. Be sure that they use beads as measures of weight. Give them a chance to discover how the balances operate. Caution them that the scales will not tolerate rough treatment and that they should not attempt to weigh large or heavy objects. Each team should list the objects they weigh and record the weight in beads. Provide no further instructions or comments until the students have ample opportunity to practice on their own.

Circulate among the groups, offering suggestions and answering questions. It may be necessary to demonstrate to individuals or small groups how to use the balance if they appear to be having difficulty. Provide them with objects to weigh if necessary. You may wish to suggest such activities as comparing the weight of a penny or nickel to that of a quarter. Encourage groups to exchange objects and compare measurements with each other.

Continue to work with groups or students individually until you are satisfied they can operate the balances

## TEACHING STRATEGIES

chain of 5 beads  
chains of 2 beads  
single beads

activity period by saying:

ORDER FOR SCIENTISTS TO DO EXPERIMENTS  
EARLY THEY OFTEN NEED TO WEIGH SOME OF  
MATERIALS THEY WILL BE EXPERIMENTING  
SINCE WE WILL BE DOING SOME EXPERIMENTS  
IT IS NECESSARY TO WEIGH THINGS, WE MUST  
TO USE A BALANCE CORRECTLY.

students into groups of three. Distribute equal-  
kits to each group.

students to use the scales to weigh things. Be sure  
use beads as measures of weight. Give them a  
discover how the balances operate. Caution them  
scales will not tolerate rough treatment and that  
do not attempt to weigh large or heavy objects.  
should list the objects they weigh and record  
in beads. Provide no further instructions or  
until the students have ample opportunity to  
on their own.

among the groups, offering suggestions and  
questions. It may be necessary to demonstrate  
equals or small groups how to use the balance  
appear to be having difficulty. Provide them  
to weigh if necessary. You may wish to  
such activities as comparing the weight of a  
nickel to that of a quarter. Encourage groups  
the objects and compare measurements with each

to work with groups or students individually  
are satisfied they can operate the balances

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-11

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Students:

--use the balance to weigh a variety of objects and  
express the weight in numbers of beads.

## MATERIALS

## TEACHING STRATEGIES

properly. See that each student has a chance to weigh and that one person does not dominate a particular group of students.

While the balance is capable of weighing objects to less than a whole bead it will probably never be necessary in this program to weigh with such precision. By weighing only to the nearest bead, the students will become familiar with the balance without the added confusion of making sliding weight adjustments for each weighing.

WEIGHING TIME

When the weighing has been concluded encourage the students to compare their results. Say:

HOW MANY OF YOU WEIGHED A PENNY?

(Student), HOW MANY BEADS DID YOUR PENNY WEIGH?

Write "PENNY" on the board and its weight in beads. Ask other students for the weights of their pennies. Record their answers on the board. Repeat this strategy for a variety of objects. Praise students for accuracy when it is achieved, and discuss any problems some may have had with the balance.

Conclude by asking:

WHAT DID YOU FIND OUT ABOUT DIFFERENT OBJECTS BY WEIGHING THEM?

## TEACHING STRATEGIES

Make sure that each student has a chance to weigh so that no person does not dominate a particular group.

Since the balance is capable of weighing objects to less than one milligram, it will probably never be necessary in this activity to weigh with such precision. By weighing the nearest milligram, the students will become familiar with the balance without the added confusion of making small adjustments for each weighing.

### WEIGHING TIME

When the weighing has been concluded, encourage the students to compare their results. Say:

"HOW MANY OF YOU WEIGHED A PENNY?"

"HOW MANY OF YOU, HOW MANY BEADS DID YOUR PENNY WEIGH?"

Record the weight on the board and its weight in beads. Ask the students for the weights of their pennies. Record the weights on the board. Repeat this strategy for a variety of objects. Praise students for accuracy when they are correct, and discuss any problems some may have had with the balance.

Asking:

"HOW DO YOU FIND OUT ABOUT DIFFERENT OBJECTS AND THEIR WEIGHTS?"

## ANTICIPATED STUDENT BEHAVIORS

Students:

--raise their hands.

--state the number of beads.

--comment about greater differences in weight than expected, "Some things look heavy but aren't,"  
"Some small things weigh more than bigger things."

UNIT III, CORE B  
ACTIVITY 3-11: "Measuring With A Balance"

Activity name suggested by class:

Teacher	
BSCS USE:	Post Tally Rev
Day 1	Day 2
Day 3	Day 4
Day 5	Day 6

1.	Date taught (month and date, e.g. 11/2)					
2.	Minutes of class time on science each day					
3.	Minutes of preparation each day					
4.	Students absent on each date (Use ID Number)					

5. Interest of class as expressed by apparent attention to what is happening.Number of students responding with: Name students you noted especially:  
(Number)

HIGH INTEREST	_____
MODERATE INTEREST	_____
INDIFFERENCE	_____
MODERATE RESISTANCE	_____
STRONG DISLIKE	_____
HARD TO RATE	_____

6. Equipment in kit: ☐ None ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use
7. Equipment I got: ☐ None ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

Materials used:	Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:
10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:
11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:
12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?
13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:
14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:
15. Your rating of this activity:  
☐ Worthwhile ☐ Of value--needs t.e ☐ Worth salvaging--make ☐ Worthless  
--keep as is revision suggested major changes described --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:



7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

Materials used:	Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:
10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:
11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -Pages and Problem:
12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No -Why not?
13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:
14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:
15. Your rating of this activity:  
☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless  
--keep as is revision suggested major changes described --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed.  
What parts of this activity should be retained when the curriculum is revised?  
Page(s) \_\_\_\_\_:

17. Did students encounter any difficulty in balancing or using the balances?  
☐ No ☐ Yes: Comment.

18. In your judgment, how many students are not able to accurately use the balance in weighing something?  
☐ None ☐ 1/4 ☐ 1/2 ☐ All: Comment.

19. Concern (or questions) about content:

20. Messages for staff (read immediately):

BSCS Evaluation: EMH Feedback Form 1c

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

UNIT III, CORE B  
ACTIVITY 3-11: "Measuring With A Balance"

Teacher \_\_\_\_\_

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.



## Me and my Environment

### OBJECTIVE FOCUS FOR THIS ACTIVITY

#### UNIT GOALS:

1. Realize and appreciate the energy inter-relationships between organisms.

#### CORE B OBJECTIVES:

1. Recognize that food is our main source of energy.
3. Determine that different foods have different amounts of energy.
4. Determine that increased activity requires an increased amount of energy.

### MATERIALS

### TEACHING STRATEGIES

#### Activity 3-12. Measuring Energy Values

*During this activity students will build a calorimeter, which they will use to measure energy values of foods. A calorimeter is an apparatus for measuring amounts of heat, literally a "calorie measurer."*

**FOCUS FOR THIS ACTIVITY****GOALS:**

1. Realize and appreciate the energy inter-relationships between organisms.

**B OBJECTIVES:**

1. Recognize that food is our main source of energy.
3. Determine that different foods have different amounts of energy.
4. Determine that increased activity requires an increased amount of energy.

**TEACHING STRATEGIES****3-12. Measuring Energy Values**

*As activity students will build a calorimeter, they will use to measure energy values of foods. A calorimeter is an apparatus for measuring amounts of energy. Generally a "calorie measurer."*

**UNIT III.****ENERGY RELATIONSHIPS  
IN MY ENVIRONMENT****CORE B.****ENERGY IN FOOD****BSCS****ACTIVITY 3-12. MEASURING ENERGY  
VALUES****ANTICIPATED STUDENT BEHAVIORS**

*At the end of this activity, each student should:*

- have followed directions correctly to help make a calorimeter.*
- have explained that to compare the energy in different foods one must work with equal amounts.*
- have weighed equal portions of a variety of foods.*
- have tested by burning a variety of foods.*
- have completed Worksheet 3-12.*
- have said that the food that caused the greatest temperature change had the most energy.*
- have explained that the number of calories in food is related to the amount of energy in food; the more calories, the more go-power the food has.*
- have defined "calorie" as referring to the amount of energy in foods.*

# ACTIVITY 3-12

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## MATERIALS

## TEACHING STRATEGIES

\*Pliers  
Balances  
\*35mm Slide projector  
\*Can openers (can punch and standard opener)  
\*Large juice can (4" diameter, 7" tall)  
Large Pyrex test tubes  
\*Pencils or sticks  
Black rubber washers  
\*A piece of 1/4" hardware cloth, 3" square, for each group  
\*Matches (preferably fireplace type)  
Metal-backed thermometers  
Two beakers per group  
\*Hot pads  
\*Food (walnuts, marshmallows, potato chips, bacon)  
Worksheet 3-12  
Slide 3-21  
Slide 3-22  
Worksheet 3-13  
Slide 3-23  
\*12" String  
\*Calorie book, *Calorie Counter*, Dell Pub. Co., 1972, 750 Third Ave., N.Y., N.Y. 10017)  
\*Aluminum foil  
Camera (Polaroid Square Shooter)  
Polaroid film  
Flash bulbs

\*Not furnished in materials kit

### Teacher Preparation:

1. This activity will likely take two or three class periods. For this reason it is divided into four parts: constructing the calorimeter, weighing food portions, burning foods, and discussion. It is recommended you do not attempt to complete all parts of this activity in one session.
2. Not all foods burn well, therefore it is highly recommended that the following foods be used to insure maximum success: miniature marshmallows, walnut chips, potato chips, very crisp dry bacon (prepared ahead of time). (Students may be interested in trying other foods; most foods will not burn successfully, when students use this simple apparatus, however, because of its makeup and/or high water content.)

### Part I. Constructing The Calorimeter

Begin by asking:

IN ONE OF OUR EARLIER ACTIVITIES WE STUDIED FOOD TO FIND OUT IF IT HAS ENERGY. IS THERE ENERGY IN FOOD?

DO YOU THINK THAT ALL FOODS HAVE THE SAME AMOUNT OF ENERGY STORED IN THEM?

LET'S BUILD A SCIENTIFIC INSTRUMENT TO HELP US FIND OUT IF THERE ARE DIFFERENT AMOUNTS OF ENERGY IN DIFFERENT FOODS. SUCH AN INSTRUMENT IS CALLED A CALORIMETER (pronounced kal-o-rim-é-ter). (Write the term on the board.) IT MEASURES THE AMOUNT OF HEAT FOOD GIVES OFF WHEN WE BURN IT.

## TEACHING STRATEGIES

### Introduction:

This activity will likely take two or three class periods. For this reason it is divided into four parts: constructing the calorimeter, weighing food samples, burning foods, and discussion. It is intended you do not attempt to complete all parts of this activity in one session.

Some foods burn well, therefore it is highly recommended that the following foods be used to achieve maximum success: miniature marshmallows, potato chips, potato chips, very crisp dry cereals (prepared ahead of time). (Students may be interested in trying other foods; most foods do not burn successfully, when students use the simple apparatus, however, because of its low moisture and/or high water content.)

### Constructing The Calorimeter

### Engaging:

FROM OUR EARLIER ACTIVITIES WE STUDIED HOW TO FIND OUT IF IT HAS ENERGY. IS THERE ENERGY IN FOOD?

DO YOU THINK THAT ALL FOODS HAVE THE SAME AMOUNTS OF ENERGY STORED IN THEM?

WE WILL BUILD A SCIENTIFIC INSTRUMENT TO HELP US FIND OUT IF THERE ARE DIFFERENT AMOUNTS OF ENERGY IN DIFFERENT FOODS. SUCH AN INSTRUMENT IS CALLED A CALORIMETER (pronounced kal-o-rim-é-ter). Write the term on the board.) IT MEASURES THE AMOUNT OF HEAT FOOD GIVES OFF WHEN WE BURN IT.

## ANTICIPATED STUDENT BEHAVIORS

### Students:

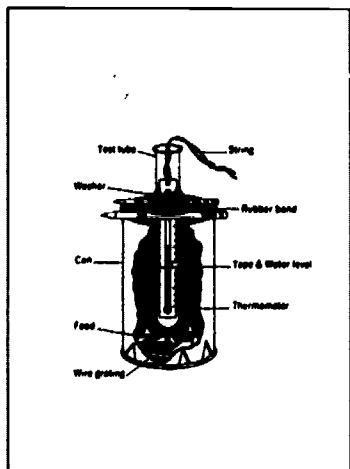
--recall previous activities and respond, "Yes."

--respond, "Yes," "No," "I doubt it," "Depends on how heavy they are."

## MATERIALS

Slide 3-21

Worksheet 3-12



## TEACHING STRATEGIES

Divide the class into groups of two or three. Distribute the calorimeter materials and allow the students to construct the calorimeter apparatus.

Distribute Worksheet 3-12 to each student. It is a diagram of the calorimeter for students to refer to as they are constructing the apparatus. Project Slide 3-21 of Worksheet 3-12 and give the following instructions:

1. Remove paper from the can.
2. Using a can punch (beer can opener) make eight or nine holes around the bottom edge of the can.
3. Using a standard can opener, cut out the top and bottom of the can.
4. Bend the triangular points (from the punch cuts) back over the bottom edge so they do not stick out into the center of the can. These cuts are very sharp and must be bent carefully.
5. Bend down edges of hardware cloth (screening) to form a grate. Check to see that the can fits easily over the grating.
6. Lubricate the test tube and slip the toilet washer on from the bottom to about 2" from the top with the wide edge down. If a washer is not available it may be possible to substitute one or two heavy rubber bands.
7. Join two pencils or dowel sticks together with rubber bands.
8. Pulling pencils apart, slip the test tube through the pencils so that the bottom of the washer rests on the pencils.

## TEACHING STRATEGIES

class into groups of two or three. Distribute meter materials and allow the students to the calorimeter apparatus.

Worksheet 3-12 to each student. It is a diagram rimeter for students to refer to as they are g the apparatus. Project Slide 3-21 of -12 and give the following instructions:

the paper from the can.

a can punch (beer can opener) make eight or holes around the bottom edge of the can.

a standard can opener, cut out the top and m of the can.

the triangular points (from the punch cuts) over the bottom edge so they do not stick into the center of the can. These cuts very sharp and must be bent carefully.

down edges of hardware cloth (screening) to a grate. Check to see that the can fits y over the grating.

cate the test tube and slip the toilet r on from the bottom to about 2" from the ith the wide edge down. If a washer is not able it may be possible to substitute one o heavy rubber bands.

two pencils or dowel sticks together with r bands.

ng pencils apart, slip the test tube through pencils so that the bottom of the washer on the pencils.

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-12

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ACTIVITY 3-12

MATERIALS

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TEACHING STRATEGIES

9. Tie a 12" length of string to the top of the thermometer.
10. Place a small piece of masking tape on the test tube 3" from the bottom. This will mark the water level to be used when the food is burned.
11. Place the thermometer in the test tube. Make sure the string is hanging outside the can so that it does not catch fire while the food is burning.

Check to see that the calorimeters are constructed properly, giving assistance where necessary. You may take a picture of each team while it is engaged in constructing the calorimeter. (Send any pictures to BSCS with the feedback for this activity.)

Hold up and display one of the setups with the test tube filled with water to the level of the masking tape, and say:

NOW THAT WE HAVE CONSTRUCTED OUR CALORIMETERS,  
WE WILL BE BURNING FOOD ON THE WIRE GRATING  
WITH THE TEST TUBE OF WATER SITTING ABOVE THE  
FLAME.

Then ask:

WHAT KIND OF ENERGY WILL BE GIVEN OFF WHEN WE  
BURN SOME FOOD IN OUR CALORIMETER?

IF HEAT ENERGY IS GIVEN OFF FROM FOOD BURNING  
IN YOUR CALORIMETER, THEN WHERE WOULD THE HEAT  
GO?

HOW COULD WE MEASURE HOW MUCH OF THE HEAT ENERGY  
GOES TO THE WATER IN THE TEST TUBE?

Stud

--co

--pr

--re

--su

## TEACHING STRATEGIES

12" length of string to the top of the meter.

a small piece of masking tape on the test tube from the bottom. This will mark the level to be used when the food is burned.

the thermometer in the test tube. Make the string is hanging outside the can so it does not catch fire while the food is burning.

that the calorimeters are constructed giving assistance where necessary. You may take each team while it is engaged in constructing the calorimeter. (Send any pictures to BSCS with the results of this activity.)

display one of the setups with the test tube containing water to the level of the masking tape, and say:

"WE HAVE CONSTRUCTED OUR CALORIMETERS, WE ARE BURNING FOOD ON THE WIRE GRATING ABOVE THE TEST TUBE OF WATER SITTING ABOVE THE

"AND OF ENERGY WILL BE GIVEN OFF WHEN WE BURN THE FOOD IN OUR CALORIMETER?"

"ENERGY IS GIVEN OFF FROM FOOD BURNING IN OUR CALORIMETER, THEN WHERE WOULD THE HEAT

"AND WE MEASURE HOW MUCH OF THE HEAT ENERGY WE CAN MEASURE IN THE WATER IN THE TEST TUBE?"

## ANTICIPATED STUDENT BEHAVIORS

Students:

--construct calorimeter.

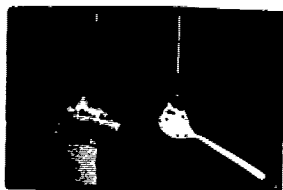
--predict heat energy.

--respond, "Air," "Can," "Water," "Up."

--suggest using a thermometer.

## MATERIALS

Slide 3-22



## TEACHING STRATEGIES

### Part II.

Project Slide 3-22 illustrating sugar and peanuts being burned.

Ask:

SUPPOSE WE WERE TO BURN A WHOLE BAG OF PEANUTS, (point) AND ONE TEASPOON OF SUGAR (point). WHICH WOULD GIVE OFF THE MOST ENERGY?

DOES THIS PROVE PEANUTS HAVE MORE ENERGY THAN THE SUGAR?

WHY NOT?

HOW COULD WE SHOW WHICH KIND OF FOOD DOES GIVE OFF THE MOST ENERGY, PEANUTS OR SUGAR?

If the desired response is not forthcoming, display the balance and ask:

HOW COULD WE USE THIS TO HELP US SEE WHICH KIND OF FOOD GIVES OFF THE MOST ENERGY?

HOW COULD WE MAKE SURE WE HAVE EQUAL AMOUNTS OF FOOD BEFORE BURNING THEM?

HOW WOULD WE USE THE BALANCE AND WEIGHTS TO WEIGH EQUAL AMOUNTS OF FOOD?

Begin the experiment portion of the activity by saying:

## TEACHING STRATEGIES

Figure 3-22 illustrating sugar and peanuts being

IF WE WERE TO BURN A WHOLE BAG OF PEANUTS,  
AND ONE TEASPOON OF SUGAR (point). WHICH  
GIVE OFF THE MOST ENERGY?

HOW CAN WE PROVE PEANUTS HAVE MORE ENERGY THAN THE

?

HOW CAN WE SHOW WHICH KIND OF FOOD DOES GIVE  
THE MOST ENERGY, PEANUTS OR SUGAR?

If the desired response is not forthcoming,  
display the balance and ask:

HOW COULD WE USE THIS TO HELP US SEE WHICH  
KIND OF FOOD GIVES OFF THE MOST ENERGY?

HOW COULD WE MAKE SURE WE HAVE EQUAL AMOUNTS  
OF FOOD BEFORE BURNING THEM?

HOW WOULD WE USE THE BALANCE AND WEIGHTS TO  
WEIGH EQUAL AMOUNTS OF FOOD?

Experiment portion of the activity by saying:

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-12

101

Students:

--predict, "Peanuts."

--respond, "No."

--indicate that there are more peanuts than sugar.

--suggest burning equal amounts of both foods.

--recall weighing with the balance and suggest  
weighing out and then burning equal amounts of  
both foods.

--suggest weighing the food, using a balance.

--suggest putting a certain number of weights  
in one balance pan and adding food to the other  
until it balances.

# ACTIVITY 3-12

101

## MATERIALS

Date \_\_\_\_\_ Name \_\_\_\_\_

FOOD TO BE TESTED	TEMPERATURE BEFORE BURNING	TEMPERATURE AFTER BURNING	TEMPERATURE BEFORE BURNING (WATER TEMPERATURE AFTER BURNING)

Slide 3-23

Worksheet 3-13

## TEACHING STRATEGIES

YOUR SUGGESTIONS FOR WEIGHING WERE GOOD, BUT SO THAT WE ARE ALL TESTING THE FOODS IN THE SAME WAY, LET'S USE THREE BEADS, OR WEIGHTS, AS THE AMOUNT THAT WE WILL USE EACH TIME.

Have the students weigh the foods they will burn by putting three beads, or weights, on one pan and balance that with a portion of each food they are to test. Instruct them to start with a larger amount of food and gradually remove small portions until the food balances the weight. If the foods will not be burned until the next day distribute beakers or other small containers to each team to put their weighed portion of food in.

Ask:

WHY DO WE NEED TO USE EQUAL AMOUNTS OF EACH FOOD?

### Part III.

Pass out Worksheet 3-13 to students. Project Slide 3-23 of Worksheet 3-13 and explain how it is to be used. Points to be emphasized:

1. Write down the names of the foods to be tested.
2. Distribute a beaker of tap water to each group and an empty beaker in which to empty the heated water after each experiment.
3. Check and record the temperature of the water in the test tube before burning each food.



## TEACHING STRATEGIES

SUGGESTIONS FOR WEIGHING WERE GOOD, BUT SO  
ARE ALL TESTING THE FOODS IN THE SAME  
T'S USE THREE BEADS, OR WEIGHTS, AS THE  
THAT WE WILL USE EACH TIME.

Students weigh the foods they will burn by put-  
beads, or weights, on one pan and balance that  
on of each food they are to test. Instruct  
it with a larger amount of food and gradually  
portions until the food balances the weight.  
s will not be burned until the next day  
beakers or other small containers to each  
their weighed portion of food in.

WE NEED TO USE EQUAL AMOUNTS OF EACH

Worksheet 3-13 to students. Project Slide 3-23  
t 3-13 and explain how it is to be used. Points  
sized:

down the names of the foods to be tested.

ibute a beaker of tap water to each group  
n empty beaker in which to empty the heated  
after each experiment.

and record the temperature of the water  
be before burning each food.

## ANTICIPATED STUDENT BEHAVIORS

Students:

--weigh equal portions of food.

--recall slide of peanuts and sugar and respond, "In  
order to have a good test," "To get the right  
amounts of energy."



## MATERIALS

## TEACHING STRATEGIES

Temperatures are to be recorded in degrees Fahrenheit.

4. Record the temperature of the water immediately after the food is burned (as much as it can be). Sometimes the flames may go out prematurely. The food needs to be reignited in such cases.
5. Calculate the change of temperature by subtracting the starting temperature from the temperature after burning. This can be done after each test or after all tests are completed.

Demonstrate the procedure for using the calorimeter by giving the following directions for burning foods to the students while actually carrying them out yourself.

1. LAY DOWN A SHEET OF ALUMINUM FOIL AND SET THE WIRE GRATING IN THE MIDDLE.
2. FILL THE TEST TUBE WITH 3 INCHES OF WATER (to the tape line). INSERT THE THERMOMETER INTO THE TEST TUBE. PLACE THE TEST TUBE IN POSITION ON THE CAN AND HAVE THE CAN AND TEST TUBE SITTING TO ONE SIDE READY TO PLACE OVER THE BURNING FOOD.
3. PLACE THE WEIGHED PORTION OF FOOD TO BE TESTED IN A SMALL PILE ON THE CENTER OF THE GRATING.
4. LIGHT THE FOOD BY HOLDING A BURNING MATCH UNDER THE FOOD ON THE GRATE.

Since some of the foods are at first difficult to ignite, it is recommended that long fireplace matches be used.

5. WHEN THE FOOD HAS BEGUN TO BURN ON ITS OWN, CAREFULLY PLACE THE CALORIMETER OVER THE GRATING SO THAT THE TEST TUBE IS DIRECTLY ABOVE THE BURNING FOOD.

### TEACHING STRATEGIES

temperatures are to be recorded in degrees Fahrenheit.

Record the temperature of the water immediately after the food is burned (as much as it can be). Sometimes the flames may go out prematurely. The food needs to be reignited in such cases.

Calculate the change of temperature by subtracting the starting temperature from the temperature after burning. This can be done after each test or after all tests are completed.

Explain the procedure for using the calorimeter by following directions for burning foods to students while actually carrying them out yourself.

LAY DOWN A SHEET OF ALUMINUM FOIL AND SET THE WIRE GRATING IN THE MIDDLE.

FILL THE TEST TUBE WITH 3 INCHES OF WATER (to the tape line). INSERT THE THERMOMETER INTO THE TEST TUBE. PLACE THE TEST TUBE IN POSITION UNDER THE CAN AND HAVE THE CAN AND TEST TUBE READY TO ONE SIDE READY TO PLACE OVER THE BURNING FOOD.

PLACE THE WEIGHED PORTION OF FOOD TO BE TESTED ON A SMALL PILE ON THE CENTER OF THE GRATING.

IGNITE THE FOOD BY HOLDING A BURNING MATCH UNDER THE FOOD ON THE GRATE.

If the foods are at first difficult to ignite, recommend that long fireplace matches be used.

WHEN THE FOOD HAS BEGUN TO BURN ON ITS OWN, CAREFULLY PLACE THE CALORIMETER OVER THE GRATING SO THAT THE TEST TUBE IS DIRECTLY ABOVE THE BURNING FOOD.

### ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-12

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## MATERIALS

## TEACHING STRATEGIES

6. ALLOW THE FOOD TO BURN AS COMPLETELY AS POSSIBLE. IT MAY BE NECESSARY TO REMOVE THE CALORIMETER BRIEFLY TO RELIGHT THE FOOD.
7. USING THE STRING, REMOVE THE THERMOMETER AND QUICKLY READ THE TEMPERATURE AND RECORD IT ON THE WORKSHEET.

Instruct students that the procedure is the same for other foods. Remind students to start each test with a new supply of tap water. Be sure to fill the tube to tape mark to insure that an equal amount of water is used for each test.

Stress the importance of taking and recording the temperature of the water at the beginning of each test.

Now allow them to begin testing foods. Be prepared to give help to each team when necessary. You may photograph students while they are engaged in testing the foods. (Send any photos to the BSCS office with your feedback forms for this activity. Don't forget to label photos.)

As teams finish testing a particular food, encourage students to discuss and compare their data and try to account for any apparent differences. Such things as differing amounts of food, different beginning temperatures, and having the flame go out and have to be reignited may be factors causing variation. Students will need help in finding the amount of temperature change. It is this information that should be compared.

Part IV.

After the data has been collected and discussed, ask:

IF YOU WANTED A FOOD THAT WOULD SUPPLY A LOT OF ENERGY, OR "GO POWER," WHICH OF THE FOODS YOU BURNED WOULD YOU CHOOSE?

## TEACHING STRATEGIES

LOW THE FOOD TO BURN AS COMPLETELY AS POSSIBLE.  
MAY BE NECESSARY TO REMOVE THE CALORIMETER  
EFLY TO RELIGHT THE FOOD.

ING THE STRING, REMOVE THE THERMOMETER AND  
ICKLY READ THE TEMPERATURE AND RECORD IT ON  
E WORKSHEET.

udents that the procedure is the same for other  
and students to start each test with a new  
ap water. Be sure to fill the tube to tape  
ure that an equal amount of water is used for

importance of taking and recording the  
of the water at the beginning of each

em to begin testing foods. Be prepared to  
each team when necessary. You may photograph  
le they are engaged in testing the foods.  
otos to the BSCS office with your feedback  
is activity. Don't forget to label photos.)

ish testing a particular food, encourage  
discuss and compare their data and try to  
any apparent differences. Such things as  
ounts of food, different beginning tempera-  
aving the flame go out and have to be reignited  
rs causing variation. Students will need help  
he amount of temperature change. It is this  
that should be compared.

ta has been collected and discussed, ask:

WANTED A FOOD THAT WOULD SUPPLY A LOT OF  
OR "GO POWER," WHICH OF THE FOODS YOU  
WO U CHOOSE?

## ANTICIPATED STUDENT BEHAVIORS

Students:

--engage in food testing process.

--choose the one which had caused the greatest  
temperature changes.

## MATERIALS

## TEACHING STRATEGIES

WHAT IN THE EXPERIMENT MADE YOU THINK (food chosen) HAS THE MOST "GO POWER"?

CAN ANYONE TELL ME WHAT WORD WE USE TO DESCRIBE THE AMOUNT OF ENERGY IN FOODS?

Students may or may not be familiar with the term "calorie." While they have probably heard the term associated with food, it is unlikely that they understand the word's meaning.

If the students do not suggest the word calorie, ask:

HAVE ANY OF YOU EVER BEEN ON A DIET? OR KNOW SOMEONE WHO IS ON ONE?

WHAT DOES A PERSON ON A DIET HAVE TO COUNT CAREFULLY?

Then say:

THE TERM "CALORIE" IS USED TO DESCRIBE THE AMOUNT OF ENERGY IN FOODS.

Write "calorie" on the board.

Distribute calorie booklets and say:

SCIENTISTS USED CALORIMETERS THAT ARE Fancier AND MORE ACCURATE THAN OURS TO MEASURE THE AMOUNT OF HEAT ENERGY GIVEN OFF WHEN FOOD IS BURNED. THIS HEAT ENERGY, OR THE NUMBER OF CALORIES IS LISTED IN THE BOOK THAT WAS JUST GIVEN TO YOU. WE CAN USE THIS BOOK TO LOOK UP THE NUMBER OF CALORIES IN MOST OF THE FOODS THAT WE EAT.

## TEACHING STRATEGIES

IN THE EXPERIMENT MADE YOU THINK (food chosen)  
THE MOST "GO POWER"?

ANYONE TELL ME WHAT WORD WE USE TO DESCRIBE  
AMOUNT OF ENERGY IN FOODS?

ay or may not be familiar with the term  
While they have probably heard the term  
with food, it is unlikely that they understand  
meaning.

If the students do not suggest the word  
calorie, ask:

HAVE ANY OF YOU EVER BEEN ON A DIET? OR KNOW  
SOMEONE WHO IS ON ONE?

WHAT DOES A PERSON ON A DIET HAVE TO COUNT  
CAREFULLY?

TERM "CALORIE" IS USED TO DESCRIBE THE AMOUNT  
ENERGY IN FOODS.

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STISTS USED CALORIMETERS THAT ARE FANCIER AND  
ACCURATE THAN OURS TO MEASURE THE AMOUNT OF  
ENERGY GIVEN OFF WHEN FOOD IS BURNED. THIS  
ENERGY, OR THE NUMBER OF CALORIES IS LISTED  
E BOOK THAT WAS JUST GIVEN TO YOU. WE CAN  
HIS BOOK TO LOOK UP THE NUMBER OF CALORIES  
ST OF THE FOODS THAT WE EAT.

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-12

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Students:

--associate a greater temperature change with a  
greater release of stored energy.

--may or may not respond, "Calorie."

--indicate knowing a friend or relative who has  
dieted.

--respond, "Calories."

ACTIVITY 3-12

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**MATERIALS**

**TEACHING STRATEGIES**

After students have had ample time to page through and examine the book, say:

LET'S NOW LOOK UP THE NUMBER OF CALORIES IN ONE OF THE FOODS THAT WE BURNED. FIRST, HOW MANY CALORIES ARE IN WALNUTS?

Write the word "walnuts" on the board and assist the students in locating the number of calories. Write it on the chalkboard also.

Have the students suggest other foods the class can look up and add these to the list on the board.

Remind students that the number of calories refers to a certain portion of that food, usually the amount in one serving that we would eat.

Conclude by asking:

CALORIES REFER TO THE AMOUNT OF ENERGY IN FOODS. DO ALL OF THE FOODS WE EAT CONTAIN THE SAME AMOUNT OF ENERGY?

Collect Worksheet 3-13 and tabulate the information on Tallysheet 3-6.

## TEACHING STRATEGIES

Students have had ample time to page through and the book, say:

Now look up the number of calories in  
of the foods that we burned. First, how  
calories are in walnuts?

Word "walnuts" on the board and assist the  
in locating the number of calories. Write it on  
board also.

Students suggest other foods the class can look  
and these to the list on the board.

Students that the number of calories refers to a  
portion of that food, usually the amount in one  
that we would eat.

by asking:

Calories refer to the amount of energy in foods.  
All of the foods we eat contain the same amount  
of energy?

Worksheet 3-13 and tabulate the information on  
t 3-6.

## ANTICIPATED STUDENT BEHAVIORS

Students:

--look up the word walnut and the amount of calories  
walnuts contain.

--look up suggested foods.

--recall the experiment with the calorimeter  
and infer that different foods have different  
amounts of energy.

Teacher \_\_\_\_\_

Date \_\_\_\_\_

UNIT III, CORE B  
TALLYSHEET 3-6: Tabulation of Data on Worksheet 3-13  
ACTIVITY 3-12: "Measuring Energy Values"

Column 1 (Team). Indicate which students worked together by circling 1 for members of one group, 2 for all members on the next, etc. When tallysheet is completed, the results by team should be identical. If not, some students need extra help in working with a group, recording data, etc.

**Column 2 (Completed Worksheet).** Some students may not have understood the experiment or had problems. Explore and provide further opportunities to succeed with this activity.

Column 3 (Subtraction). This tally will indicate the amount of difficulty your class had with subtraction. If substantial, further discussion of corrected results may be needed.

**Column 4 (Amount of Change).** Write in the number of degrees of change for each food listed. Were differences minimal? Were students finding the same relative order of energy levels for food (i.e., walnuts have most, bacon least, etc.)? If not, then their results are not comparable. Some teams may need to repeat tests of some foods.

[illegible]

ERIC  
Full Text Provided by ERIC

ERIC  
Full Text Provided by ERIC



UNIT III, CORE B  
ACTIVITY 3-12: "Measuring Energy Values"

Activity name suggested by class: \_\_\_\_\_

Teacher	
BSCS USE:	Post Tally Rev
Day 1	Day 2
Day 3	Day 4
Day 5	Day 6

1.	Date taught (month and date, e.g. 11/2)					
2.	Minutes of class time on science each day					
3.	Minutes of preparation each day					
4.	Students absent on each date (Use ID Number)					

5. Interest of class as expressed by apparent attention to what is happening.Number of students responding with: \_\_\_\_\_ Name students you noted especially: \_\_\_\_\_  
(Number)

HIGH INTEREST	_____
MODERATE INTEREST	_____
INDIFFERENCE	_____
MODERATE RESISTANCE	_____
STRONG DISLIKE	_____
HARD TO RATE	_____

6. Equipment in kit: ☐ None ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use
7. Equipment I got: ☐ None ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:	Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:
10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:
11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:
12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?
13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:
14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:
15. Your rating of this activity:  
☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless  
--keep as is revision suggested major changes described --drop it
- SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

Equipment I got: ☐ None ☐ Easy ☐ Hard to get, ☐ Hard to get, ☐ Unobtainable,  
needed to get but okay add to kit add to kit

Materials used:	Worksheet # # #	Game #	Slides (show slide nos.)	Transparency # # #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:
10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:
11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:
12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?
13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:
14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:

☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless  
--keep as is revision suggested major changes described --drop it  
-----

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed.  
What parts of this activity should be retained when the curriculum is revised?  
Page(s) \_\_\_\_\_:

17. Did any students encounter difficulty building the calorimeter?  
☐ No ☐ Yes: Comment.

18. Did students have difficulty  
--burning foods? ☐ No ☐ Yes: Comment.

--reading and recording temperature? ☐ No ☐ Yes: Comment.

--finding the change in temperature? ☐ No ☐ Yes: Comment.

19. Concern (or questions) about content:

20. Messages for staff (read immediately):

BSCS Evaluation: EMH Feedback Form 1c

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

SIDE A

UNIT III, CORE B  
ACTIVITY 3-12: "Measuring Energy Values"

Teacher \_\_\_\_\_

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.



## Me and my Environment

### OBJECTIVE FOCUS FOR THIS ACTIVITY

#### UNIT GOALS:

1. Realize and appreciate the energy inter-relationships between organisms.

#### CORE B OBJECTIVES:

1. Recognize that food is our main source of energy.
3. Determine that different foods have different amounts of energy.
5. Realize that maintaining one's health requires eating foods which fulfill nutritional needs in addition to energy needs.

### MATERIALS

### TEACHING STRATEGIES

#### Activity 3-13. A Winner Is "Full And Healthy"

*It has been established in the previous activity that different foods give off different amounts of heat (energy) when burned. The students have learned that the scientific term applied to the unit of energy is the calorie. In order to avoid the student's wrongly associating high caloric content with the value of a food, it is necessary to introduce for some, and reinforce for others, the concept of a balanced diet. Playing the Full and Healthy game provides the student with the opportunity to select food from the four basic food groups. It will become apparent from the game that the criteria for a healthful diet includes more than calories.*

**FOCUS FOR THIS ACTIVITY**

**GOALS:**

1. Realize and appreciate the energy inter-relationships between organisms.

**OBJECTIVES:**

1. Recognize that food is our main source of energy.
3. Determine that different foods have different amounts of energy.
5. Realize that maintaining one's health requires eating foods which fulfill nutritional needs in addition to energy needs.

**TEACHING STRATEGIES**

**13. A Winner Is "Full And Healthy"**

As established in the previous activity that foods give off different amounts of heat when burned. The students have learned that the term applied to the unit of energy is calorie. In order to avoid the student's wrongly judging high caloric content with the value of energy it is necessary to introduce for some, and for others, the concept of a balanced diet. The Full and Healthy game provides the student opportunity to select food from the four basic groups. It will become apparent from the game that a healthy diet includes more than

**UNIT III.**

**ENERGY RELATIONSHIPS  
IN MY ENVIRONMENT**

**CORE B.**

**ENERGY IN FOOD**



**BSCS**

**ACTIVITY 3-13. A WINNER IS "FULL  
AND HEALTHY"**

**ANTICIPATED STUDENT BEHAVIORS**

*At the end of this activity, each student should:*

- have played both variations of the Full and Healthy game.
- have felt successful and enjoyed the game.
- have recorded on the score sheet (Worksheet 3-14) what food group requirements he has satisfied.
- have identified the four basic food groups and how many servings he should eat each day from each group.
- have recognized that to fulfill food group requirements is more important than what individual meals themselves consist of.
- have recognized that a healthful diet consists of more than just calories.

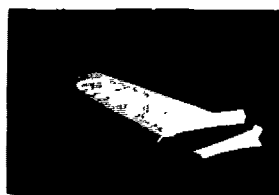
# ACTIVITY 3-13

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## MATERIALS

Deck of *Full and Healthy* cards  
per group of four students  
1 Chart of four food groups  
Book, *Calorie Counter*  
Slide 3-24  
Slide 3-25  
Worksheet 3-14  
Slide 3-26  
\*35mm Slide projector  
Worksheet 3-15  
Slide 3-27

Slide 3-24



\*Not furnished in materials kit

## TEACHING STRATEGIES

### Teacher Preparation:

Select a place to display the food group chart. Do not, however, present the chart to the students until the appropriate time in the teaching strategy.

Begin the activity by reviewing what a calorie is as developed in Activity 3-12. Say:

IN OUR LAST ACTIVITY WE OBSERVED TEMPERATURE CHANGES WHEN DIFFERENT FOODS WERE BURNED. WE LEARNED THAT WHEN SPEAKING OF THESE DIFFERENCES, FOOD SCIENTISTS USE THE TERM CALORIE.

Then ask:

WHO CAN REMEMBER AND CAN TELL THE CLASS WHAT A CALORIE IS?

Project Slide 3-24 showing a chocolate bar and ask:

DOES THIS CHOCOLATE BAR HAVE LOTS OF CALORIES, OR ENERGY?

Whether or not students recognize that chocolate bars are high in energy, ask:

WHAT COULD WE DO TO FIND OUT HOW MANY CALORIES ARE IN A CHOCOLATE BAR?

## TEACHING STRATEGIES

### Preparation:

Place to display the food group chart. Do not, present the chart to the students until the time in the teaching strategy.

Activity by reviewing what a calorie is as in Activity 3-12. Say:

LAST ACTIVITY WE OBSERVED TEMPERATURES WHEN DIFFERENT FOODS WERE BURNED. WE NOTED THAT WHEN SPEAKING OF THESE DIFFERENCES, SCIENTISTS USE THE TERM CALORIE.

DO YOU REMEMBER AND CAN TELL THE CLASS WHAT A CALORIE IS?

Show slide 3-24 showing a chocolate bar and ask:

DOES THIS CHOCOLATE BAR HAVE LOTS OF CALORIES, OR IS IT LOW IN ENERGY?

Do not let students recognize that chocolate bars are high in energy, ask:

WHAT COULD WE DO TO FIND OUT HOW MANY CALORIES ARE IN A CHOCOLATE BAR?

## ANTICIPATED STUDENT BEHAVIORS

Students:

--recall that a calorie refers to the amount of energy in food.

--may or may not respond by indicating candy bars are high in calories (energy).

--suggest burning in a calorimeter; some may want to look this information up in the calorie book.

## MATERIALS

Slide 3-25



## TEACHING STRATEGIES

If some suggest burning but not checking the calorie book, say:

CHOCOLATE IS ONE OF THE FOODS THAT WILL NOT BURN PROPERLY IN OUR CALORIMETER. FOOD SCIENTISTS HAVE BEEN ABLE TO BURN IT WITH THE SPECIAL CALORIMETERS THEY USE AND HAVE FIGURED OUT HOW MANY CALORIES A CHOCOLATE BAR HAS. WHERE COULD WE LOOK TO FIND OUT SUCH INFORMATION?

Select a student to look up "chocolate bar" and tell the class the number of calories (250). Write on the chalkboard:

"Chocolate Bar = 250 calories"

Project Slide 3-25 of teenager sitting at a table on which is a plate full of chocolate bars.

Ask:

DO YOU THINK A PERSON WOULD BE A HEALTHY PERSON IF HE ATE A MEAL LIKE THIS?

WHY WOULDN'T THIS MEAL MAKE HIM HEALTHY? IT HAS LOTS OF CALORIES AND ENERGY.

Now ask:

WHEN YOU EAT OR PLAN A MEAL, WHAT SHOULD YOU THINK ABOUT BESIDES JUST ENERGY?



## TEACHING STRATEGIES

If some suggest burning but not checking the calorie book, say:

CHOCOLATE IS ONE OF THE FOODS THAT WILL NOT BURN PROPERLY IN OUR CALORIMETER. FOOD SCIENTISTS HAVE BEEN ABLE TO BURN IT WITH THE SPECIAL CALORIMETERS THEY USE AND HAVE FIGURED OUT HOW MANY CALORIES A CHOCOLATE BAR HAS. WHERE COULD WE LOOK TO FIND OUT SUCH INFORMATION?

student to look up "chocolate bar" and tell the number of calories (250). Write on the

Chocolate Bar = 250 calories"

Slide 3-25 of teenager sitting at a table on which full of chocolate bars.

DO YOU THINK A PERSON WOULD BE A HEALTHY PERSON IF HE ATE A MEAL LIKE THIS?

WOULDN'T THIS MEAL MAKE HIM HEALTHY? IT HAS A LOT OF CALORIES AND ENERGY.

IF YOU EAT OR PLAN A MEAL, WHAT SHOULD YOU THINK ABOUT BESIDES JUST ENERGY?

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-13

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Students:

--recall the calorie book and suggest looking up the information there.

--recall what they have heard or learned previously and respond, "No."

--respond with comments such as, "Too much candy isn't good for you," "You'll get fat," "You'll get pimples," "No vitamins," etc.

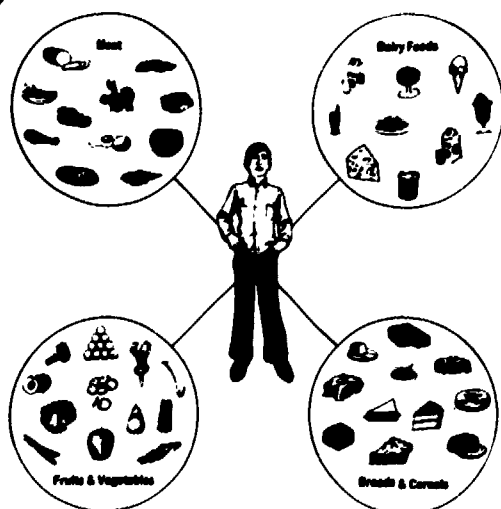
--respond by naming a variety of foods, or vitamins, minerals, etc.

# ACTIVITY 3-13

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## MATERIALS

Diagram 3-8



## TEACHING STRATEGIES

Display the food group chart (refer to Diagram 3-8) and say:

TO STAY HEALTHY, WE NEED TO EAT SEVERAL DIFFERENT KINDS OF FOOD EACH DAY, FOOD SCIENTISTS HAVE FOUND. THE FOODS WE EAT HAVE BEEN DIVIDED INTO FOUR GROUPS.

Point to the MEAT group on the chart and say:

THESE FOODS GIVE US ENERGY PLUS LOTS OF PROTEIN. (Write protein on the chalkboard.) YOU CAN SEE THIS GROUP INCLUDES MEAT, BUT THERE ARE ALSO THINGS RICH IN PROTEIN THAT COULD BE SUBSTITUTED FOR MEAT. THIS GROUP IS IMPORTANT BECAUSE IT HELPS US BUILD AND REPAIR DIFFERENT THINGS IN OUR BODIES, LIKE MUSCLES AND SKIN.

Have one or several students come to the chart and name the various foods pictured in the meat group.

Now say:

TO BE HEALTHY WE NEED TO EAT AT LEAST TWO SERVINGS EACH DAY OF THE FOODS IN THIS GROUP. DOES ANYONE KNOW HOW MUCH A SERVING IS?

A SERVING IS THE AMOUNT OF ANY FOOD MOST PEOPLE WOULD EAT DURING ONE MEAL.

Point to the MILK group and say:

THIS GROUP IS IMPORTANT BECAUSE IT GIVES US ENERGY AND HELPS OUR BODY TO GROW STRONG BONES AND TEETH. IN THIS GROUP YOU CAN SEE MILK AND FOODS MADE FROM MILK.

## TEACHING STRATEGIES

the food group chart (refer to Diagram 3-8) and

TO STAY HEALTHY, WE NEED TO EAT SEVERAL DIFFERENT  
TYPES OF FOOD EACH DAY, FOOD SCIENTISTS HAVE  
DIVIDED THE FOODS WE EAT INTO FOUR GROUPS.

Point to the MEAT group on the chart and say:

MEAT AND OTHER PROTEIN-FOODS GIVE US ENERGY PLUS LOTS OF  
PROTEIN. (Write protein on the chalkboard.)  
YOU CAN SEE THIS GROUP INCLUDES MEAT, BUT  
THERE ARE ALSO THINGS RICH IN PROTEIN THAT  
CAN BE SUBSTITUTED FOR MEAT. THIS GROUP IS  
IMPORTANT BECAUSE IT HELPS US BUILD  
AND REPAIR DIFFERENT THINGS IN OUR BODIES,  
LIKE MUSCLES AND SKIN.

Ask several students come to the chart and name  
the foods pictured in the meat group.

TO STAY HEALTHY WE NEED TO EAT AT LEAST TWO  
SERVINGS EACH DAY OF THE FOODS IN THIS GROUP.  
DO ANYONE KNOW HOW MUCH A SERVING IS?

ASK: HOW MUCH IS THE AMOUNT OF ANY FOOD MOST  
PEOPLE WOULD EAT DURING ONE MEAL.

Point to the MILK group and say:

THE MILK GROUP IS IMPORTANT BECAUSE IT GIVES US  
CALCIUM AND HELPS OUR BODY TO GROW STRONG  
BONES AND TEETH. IN THIS GROUP YOU CAN SEE  
MILK AND FOODS MADE FROM MILK.

## ANTICIPATED STUDENT BEHAVIORS

Students:

--come to the chart and identify foods.

--suggest, "Enough for just one meal," "Just a  
little," "Enough to fill you up."

## MATERIALS

## TEACHING STRATEGIES

(Student's name), WOULD YOU COME TO THE CHART AND NAME WHAT IS IN THIS GROUP?

FROM THIS GROUP WE SHOULD ALSO EAT TWO SERVINGS EACH DAY.

Point to the FRUIT-VEGETABLE group and say:

FRUITS AND VEGETABLES ARE IMPORTANT BECAUSE THEY CONTAIN VITAMINS AND MINERALS NOT IN THE MEAT OR MILK GROUP THAT WE NEED TO STAY HEALTHY, AND THEY HELP US DIGEST ALL OUR FOOD. THERE IS SOME ENERGY IN FRUITS AND VEGETABLES, TOO.

(Student's name), NAME THE FOODS IN THIS GROUP PLEASE.

If students ask about vitamins and minerals, explain that while they are sometimes referred to as food they do not give us energy. They are, however, substances found in small amounts in the food we eat which help our bodies work properly.

Then say:

EACH OF US SHOULD EAT FOUR SERVINGS OF FOODS FROM THIS GROUP EACH DAY.

Point to the BREAD AND CEREAL group and say:

THIS LAST GROUP ALSO SUPPLIES US WITH CERTAIN VITAMINS AND MINERALS, BUT MOSTLY THESE FOODS ARE EATEN BECAUSE THEY GIVE US ENERGY.

(Student's name), NAME THE FOODS IN THIS GROUP PLEASE.

## TEACHING STRATEGIES

(student's name), WOULD YOU COME TO THE  
FRUIT AND NAME WHAT IS IN THIS GROUP?

IN THIS GROUP WE SHOULD ALSO EAT TWO  
SERVINGS EACH DAY.

Join the FRUIT-VEGETABLE group and say:

FRUITS AND VEGETABLES ARE IMPORTANT BECAUSE  
THEY CONTAIN VITAMINS AND MINERALS NOT IN  
MEAT OR MILK GROUP THAT WE NEED TO  
BE HEALTHY, AND THEY HELP US DIGEST ALL  
FOOD. THERE IS SOME ENERGY IN FRUITS  
AND VEGETABLES, TOO.

(student's name), NAME THE FOODS IN THIS  
GROUP PLEASE.

When students ask about vitamins and minerals, explain that  
they are sometimes referred to as food they do not  
provide energy. They are, however, substances found in  
small amounts in the food we eat which help our bodies  
function properly.

TELL US HOW MANY OF US SHOULD EAT FOUR SERVINGS OF FOODS  
IN THIS GROUP EACH DAY.

Join the BREAD AND CEREAL group and say:

THE LAST GROUP ALSO SUPPLIES US WITH CERTAIN  
VITAMINS AND MINERALS, BUT MOSTLY THESE FOODS  
ARE EATEN BECAUSE THEY GIVE US ENERGY.

(student's name), NAME THE FOODS IN THIS GROUP  
PLEASE.

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-13

III

Students:

--name foods in milk group.

--name foods in fruit and vegetable groups.

--name the foods pictured in the bread and cereal  
group.


# ACTIVITY 3-13

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## MATERIALS

Date \_\_\_\_\_ Name \_\_\_\_\_

**SCORESHEET  
FULL AND HEALTHY GAME**



	MEAT	MILK	FRUIT & VEGETABLES	BREAD & CEREAL
1st Place				
2nd Place				
3rd Place				
4th Place				
5th Place				
6th Place				
7th Place				
8th Place				

	MEAT	MILK	FRUIT & VEGETABLES	BREAD & CEREAL
1st Place				
2nd Place				
3rd Place				
4th Place				
5th Place				
6th Place				
7th Place				
8th Place				

Slide 3-26

Worksheet 3-14

## TEACHING STRATEGIES

Then say:

EACH OF US SHOULD ALSO EAT FOUR SERVINGS OF FOODS FROM THIS GROUP EACH DAY.

It should be emphasized that all four food groups supply energy, but that each group supplies additional ingredients that are essential to health.

Now say:

THERE ARE A NUMBER OF FOODS THAT WE EAT THAT ARE HIGH IN ENERGY BUT HAVE LITTLE OR NO HEALTH VALUE. WE WILL CALL THIS GROUP THE "X-RATED" GROUP.

WHAT FOODS DO YOU THINK MIGHT BELONG IN THE X-RATED GROUP?

Now say:

TO BE FULL AND HEALTHY EACH DAY YOU NEED AT LEAST TWO SERVINGS OF MEAT OR MEAT SUBSTITUTES, TWO SERVINGS OF MILK OR MILK PRODUCTS, FOUR SERVINGS OF FRUITS AND VEGETABLES, AND FOUR OF BREADS AND CEREALS. IF YOU CHOOSE THE RIGHT KINDS OF FOODS IN THE RIGHT AMOUNTS, YOU CAN BE A WINNER IN THE *FULL AND HEALTHY* GAME. LET'S TAKE SOME TIME NOW TO PLAY THIS GAME.

Divide the class into groups of three or four and distribute a deck of *Full and Healthy* cards to each group. Every player should also receive a score sheet, Worksheet 3-14.

Project Slide 3-26 of Worksheet 3-14 and say:

THE PURPOSE OF THIS GAME, AS THE NAME SAYS, IS TO EAT SO THAT YOU ARE FULL AND HEALTHY. ON THE CARDS THAT YOU HAVE ARE FOODS THAT YOU MIGHT

## TEACHING STRATEGIES

y:

CH OF US SHOULD ALSO EAT FOUR SERVINGS OF  
ODS FROM THIS GROUP EACH DAY.

ld be emphasized that all four food groups supply  
but that each group supplies additional  
ents that are essential to health.

:

ERE ARE A NUMBER OF FOODS THAT WE EAT THAT  
E HIGH IN ENERGY BUT HAVE LITTLE OR NO  
ALTH VALUE. WE WILL CALL THIS GROUP THE  
-RATED" GROUP.

AT FOODS DO YOU THINK MIGHT BELONG IN THE  
RATED GROUP?

:

BE FULL AND HEALTHY EACH DAY YOU NEED AT  
AST TWO SERVINGS OF MEAT OR MEAT SUBSTITUTES,  
O SERVINGS OF MILK OR MILK PRODUCTS, FOUR  
RVINGS OF FRUITS AND VEGETABLES, AND FOUR  
BREADS AND CEREALS. IF YOU CHOOSE THE RIGHT  
NDS OF FOODS IN THE RIGHT AMOUNTS, YOU CAN  
A WINNER IN THE *FULL AND HEALTHY* GAME.  
T'S TAKE SOME TIME NOW TO PLAY THIS GAME.

the class into groups of three or four and  
ute a deck of *Full and Healthy* cards to each  
Every player should also receive a score sheet,  
et 3-14.

Slide 3-26 of Worksheet 3-14 and say:

E PURPOSE OF THIS GAME, AS THE NAME SAYS, IS  
EAT SO THAT YOU ARE FULL AND HEALTHY. ON THE  
D **ERIC** YOU HAVE ARE FOODS THAT YOU MIGHT

## ANTICIPATED STUDENT BEHAVIORS

Students:

--suggest, "Candy," "Pop," "Chips," etc.

--divide into groups.

## MATERIALS

## TEACHING STRATEGIES

EAT. THE WINNER OF THIS GAME IS THE FIRST PERSON TO MAKE THREE MEALS THAT INCLUDE TWO FOODS WHICH ARE MEAT OR MEAT SUBSTITUTES, TWO THAT ARE MILK OR MILK PRODUCTS, FOUR WHICH ARE FRUITS OR VEGETABLES, AND FOUR WHICH ARE BREAD OR CEREALS. THIS PERSON WILL BE THE "FULL AND HEALTHY" PERSON.

Before giving any further instructions have each group spread the cards out on their playing surfaces to become familiar with the pictures (foods) that comprise the playing decks.

Say:

THIS GAME IS SIMILAR TO RUMMY. I WILL EXPLAIN THE RULES AND THEN PLAY THE GAME WITH TWO OF YOU TO SHOW THE REST OF THE CLASS HOW IT SHOULD BE PLAYED. THEN WE WILL ALL PLAY THE GAME.

1. AFTER THE CARDS ARE SHUFFLED, EACH PLAYER WILL BE DEALT FIVE CARDS TO START WITH.
2. THE REST OF THE CARDS ARE PLACED FACEDOWN IN THE MIDDLE OF THE TABLE AND THE TOP CARD ON THAT PILE IS TURNED FACEUP BESIDE THE OTHERS.
3. EACH PLAYER LOOKS AT THE CARDS IN HIS HAND TO SEE IF ANY OF HIS CARDS COULD MAKE A MEAL. (Any combination of foods that the player might consider acceptable to eat at one sitting.)
4. THE PLAYER TO THE LEFT OF THE DEALER PLAYS FIRST. IF HE HAS A "MEAL" OF CARDS IN HIS HAND, HE MAY LAY THE GROUP FACEUP ON THE TABLE, DECLARING WHAT FOODS ARE ON THE CARDS AS HE DOES SO.



## TEACHING STRATEGIES

THE WINNER OF THIS GAME IS THE FIRST  
ON TO MAKE THREE MEALS THAT INCLUDE TWO  
WHICH ARE MEAT OR MEAT SUBSTITUTES,  
THAT ARE MILK OR MILK PRODUCTS, FOUR  
ARE FRUITS OR VEGETABLES, AND FOUR  
ARE BREAD OR CEREALS. THIS PERSON  
BE THE "FULL AND HEALTHY" PERSON.

giving any further instructions have each group  
e cards out on their playing surfaces to become  
with the pictures (foods) that comprise the  
ecks.

GAME IS SIMILAR TO RUMMY. I WILL EXPLAIN  
ULES AND THEN PLAY THE GAME WITH TWO OF  
O SHOW THE REST OF THE CLASS HOW IT SHOULD  
AYED. THEN WE WILL ALL PLAY THE GAME.

AFTER THE CARDS ARE SHUFFLED, EACH PLAYER  
WILL BE DEALT FIVE CARDS TO START WITH.

THE REST OF THE CARDS ARE PLACED FACEDOWN  
IN THE MIDDLE OF THE TABLE AND THE TOP  
CARD ON THAT PILE IS TURNED FACEUP  
ESIDE THE OTHERS.

EACH PLAYER LOOKS AT THE CARDS IN HIS HAND  
O SEE IF ANY OF HIS CARDS COULD MAKE A MEAL.  
Any combination of foods that the player  
might consider acceptable to eat at one  
sitting.)

THE PLAYER TO THE LEFT OF THE DEALER PLAYS  
FIRST. IF HE HAS A "MEAL" OF CARDS IN HIS  
HAND, HE MAY LAY THE GROUP FACEUP ON THE  
TABLE, DECLARING WHAT FOODS ARE ON THE CARDS  
S HE DOES SO.

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-13

(113)

Students:

--examine cards.

## MATERIALS

## TEACHING STRATEGIES

5. HE THEN PICKS FROM THE FACEDOWN PILE THE NUMBER OF CARDS HE JUST PUT DOWN. AFTER RESTORING HIS HAND TO FIVE CARDS HE DRAWS THE TOP CARD FROM THE DECK OR TAKES THE CARD THAT IS FACEUP ON THE DECK. HE MUST THEN DISCARD ONE CARD FROM HIS HAND SO THAT THE NUMBER OF CARDS HELD ALWAYS REMAINS AT FIVE. IT IS PLACED ON THE FACEUP PILE.
6. AFTER A PLAYER LAYS A "MEAL" DOWN ON THE TABLE, HE WILL PLACE A MARK ON HIS SCORE SHEET INDICATING THE FOOD GROUPS EATEN IN THAT MEAL.
7. EACH PLAYER TAKES HIS TURN. CARDS DRAWN ARE USED TO FORM NEW MEALS. REMEMBER TO DRAW THE SAME NUMBER OF CARDS AS WERE LAID DOWN (See Rule 5).
8. ANY CARDS FROM THE "X" GROUP MAY BE USED AS PART OF A MEAL, BUT WILL NOT COUNT AS FULFILLING THE DAILY REQUIREMENTS OF ANY FOOD GROUP.
9. IF A "WILD" CARD IS DRAWN, A PLAYER MAY USE IT FOR ANY FOOD OR FOOD GROUP HE WISHES, BUT MUST INDICATE WHAT IT IS WHEN HE LAYS IT DOWN.
10. ONLY THREE MEALS MAY BE LAID DOWN DURING THE GAME BY ANY ONE PERSON.
11. THE FIRST PERSON TO HAVE THREE MEALS IN FRONT OF HIM WHICH INCLUDE TWO FOODS FROM THE MEAT GROUP, TWO FOODS FROM THE MILK GROUP, FOUR FOODS FROM THE FRUIT AND VEGETABLE GROUP, AND FOUR FOODS FROM THE BREAD AND CEREAL GROUP WILL HAVE HAD ALL THE REQUIRED FOODS FOR A NUTRITIOUS DAILY DIET AND BE "FULL AND HEALTHY," WINNING THE GAME.

## TEACHING STRATEGIES

THEN PICKS FROM THE FACEDOWN PILE THE  
NUMBER OF CARDS HE JUST PUT DOWN. AFTER  
MOVING HIS HAND TO FIVE CARDS HE DRAWS THE  
CARD FROM THE DECK OR TAKES THE CARD  
IF IS FACEUP ON THE DECK. HE MUST THEN  
DRAW ONE CARD FROM HIS HAND SO THAT THE  
NUMBER OF CARDS HELD ALWAYS REMAINS AT FIVE.  
IS PLACED ON THE FACEUP PILE.

IF A PLAYER LAYS A "MEAL" DOWN ON THE  
TABLE, HE WILL PLACE A MARK ON HIS SCORE  
CARD INDICATING THE FOOD GROUPS EATEN IN  
THE MEAL.

THE PLAYER TAKES HIS TURN. CARDS DRAWN  
ARE USED TO FORM NEW MEALS. REMEMBER TO  
USE THE SAME NUMBER OF CARDS AS WERE  
DOWN (See Rule 5).

CARDS FROM THE "X" GROUP MAY BE USED AS  
PART OF A MEAL, BUT WILL NOT COUNT AS FULFILLING  
DAILY REQUIREMENTS OF ANY FOOD GROUP.

"WILD" CARD IS DRAWN, A PLAYER MAY USE  
IT FOR ANY FOOD OR FOOD GROUP HE WISHES,  
BUT MUST INDICATE WHAT IT IS WHEN HE LAYS  
IT DOWN.

THREE MEALS MAY BE LAID DOWN DURING THE  
GAME BY ANY ONE PERSON.

THE FIRST PERSON TO HAVE THREE MEALS IN FRONT  
OF HIM WHICH INCLUDE TWO FOODS FROM THE MEAT  
GROUP, TWO FOODS FROM THE MILK GROUP, FOUR  
FOODS FROM THE FRUIT AND VEGETABLE GROUP, AND  
TWO FOODS FROM THE BREAD AND CEREAL GROUP WILL  
BE SAID TO HAVE HAD ALL THE REQUIRED FOODS FOR A NUTRITIOUS  
DIET AND BE "FULL AND HEALTHY," WINNING  
THE GAME.

## ANTICIPATED STUDENT BEHAVIORS

## MATERIALS

## TEACHING STRATEGIES

The student should keep track of what food groups he has and how many he has on his score sheet. This will help him to keep track of what he still needs in order to win.

12. PLAYERS MAY LAY DOWN "MEALS" ONLY DURING THEIR TURNS.
13. ONCE A PLAYER HAS LAID DOWN A MEAL, HE MAY ADD TO THAT MEAL WHEN IT IS HIS TURN AND WHEN HE HAS ANOTHER CARD THAT MIGHT FIT INTO THAT MEAL.
14. TO KEEP TRACK OF THE GAMES EACH PLAYER WINS, HE SHOULD CIRCLE EACH DAY OF THE WEEK HE IS THE FULL AND HEALTHY PERSON.

Now select two or three students and go over the rules again, demonstrating how the game is played. Show students an example of each of the food group cards, an "X" card, and a "wild" card. Continue the demonstration only until the game is understood. Then allow the students to play the game as long as it seems appropriate.

Following the game choose one student and ask:

WOULD YOU DESCRIBE ONE OF THE MEALS THAT YOU LAID DOWN?

GAME TIME



## TEACHING STRATEGIES

should keep track of what food groups he has  
y he has on his score sheet. This will help  
track of what he still needs in order to win.

LAYERS MAY LAY DOWN "MEALS" ONLY DURING  
HEIR TURNS.

NCE A PLAYER HAS LAID DOWN A MEAL, HE MAY  
OD TO THAT MEAL WHEN IT IS HIS TURN AND  
HEN HE HAS ANOTHER CARD THAT MIGHT FIT  
NTO THAT MEAL.

O KEEP TRACK OF THE GAMES EACH PLAYER WINS,  
E SHOULD CIRCLE EACH DAY OF THE WEEK HE  
S THE FULL AND HEALTHY PERSON.

Two or three students and go over the rules  
nstrating how the game is played. Show students  
of each of the food group cards, an "X" card,  
' card. Continue the demonstration only until  
understood. Then allow the students to play  
long as it seems appropriate.

## GAME TIME



HAVE YOU  
INVOLVED  
ALL  
STUDENTS?

he game choose one student and ask:

YOU DESCRIBE ONE OF THE MEALS THAT  
ID DOWN?

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-13

115

Students:

- observe two or three classmates and the teacher playing the game.
- demonstrate ability to play the game following the rules described.

--respond by listing the foods in his meal.

ACTIVITY 3-13

116

MATERIALS

TEACHING STRATEGIES

Ask the class:

IS THIS THE KIND OF MEAL WE USUALLY EAT?

It is likely that the meals students lay down in the game will not necessarily be standard meals. This discussion is to establish the notion that a meal does not have to consist of the usual meat, vegetable, and salad -- or whatever -- the student may normally eat.

What is important is that as long as the required number of servings from each food group is satisfied, the makeup of the meals becomes a personal preference.

Continue by saying:

EVEN THOUGH THIS IS NOT THE USUAL KIND OF MEAL WE EAT, IS IT A NUTRITIOUS MEAL?

REMEMBER, TO BE FULL AND HEALTHY EACH DAY YOU NEED AT LEAST TWO SERVINGS OF MEAT OR MEAT SUBSTITUTES, TWO SERVINGS OF MILK OR MILK PRODUCTS, FOUR SERVINGS OF FRUITS AND VEGETABLES, AND FOUR OF BREADS AND CEREALS.

Then ask:

WHICH IS MORE IMPORTANT--WHAT IS IN A MEAL OR WHAT YOU HAVE EATEN BY THE END OF THE DAY?

WHAT THINGS SHOULD YOU EAT EACH DAY?

Collect each student score sheet and use Tallysheet 3-7 to summarize student success with the game. Note which students need help in understanding the game and plan to play the game with them the next day. If a few

## TEACHING STRATEGIES

S:

THE KIND OF MEAL WE USUALLY EAT?

that the meals students lay down in the game necessarily be standard meals. This discussion wish the notion that a meal does not have to be the usual meat, vegetable, and salad -- or the student may normally eat.

important is that as long as the required number from each food group is satisfied, the makeup becomes a personal preference.

saying:

OUGH THIS IS NOT THE USUAL KIND OF MEAL  
IS IT A NUTRITIOUS MEAL?

, TO BE FULL AND HEALTHY EACH DAY YOU  
LEAST TWO SERVINGS OF MEAT OR MEAT  
TES, TWO SERVINGS OF MILK OR MILK  
, FOUR SERVINGS OF FRUITS AND VEGETABLES,  
OF BREADS AND CEREALS.

MORE IMPORTANT--WHAT IS IN A MEAL  
YOU HAVE EATEN BY THE END OF THE DAY?

INGS SHOULD YOU EAT EACH DAY?

student score sheet and use Tallysheet 3-7  
student success with the game. Note which  
help in understanding the game and plan  
game with them the next day. If a few

## ANTICIPATED STUDENT BEHAVIORS

Students:

--respond, "No," "Yes," "Sometimes," "Not very often."

--infer because a variety of food groups  
are represented, "Yes, it is a nutritious meal."

--reply, "What you have eaten by the end of the day."

--reply, "The right number of servings from each  
food group."


## MATERIALS

Slide 3-27

Worksheet 3-15

Date \_\_\_\_\_ Name \_\_\_\_\_

**SCORESHEET  
FULL AND HEALTHY GAME**



	MEAT	DAIRY	FRUIT & VEGETABLES	BREAD & GRAINS	ENERGY	LOW
MEAT						
DAIRY						
FRUIT & VEGETABLES						
BREAD & GRAINS						
ENERGY						
LOW						
MEAT						
DAIRY						
FRUIT & VEGETABLES						
BREAD & GRAINS						
ENERGY						
LOW						

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## TEACHING STRATEGIES

students are winners, group these together so that they have more challenge and so others can be winners in the other groups. The group of winners might like to add the High- and Low-Energy rules to their games. The next time the game is played, return the worksheets you collected; it contains a second score sheet that can be used.

If students demonstrate a complete understanding of the game and are having no great difficulty playing it, the next time they play the game add Energy to the rules. Both variations of the game may be played on succeeding days.

To introduce the rules for adding Energy to the game, distribute Worksheet 3-15 and project Slide 3-27. Say:

ONE THING WE DID NOT CONSIDER WHEN PLAYING OUR GAME AND PLANNING DAILY MEALS WAS HOW MUCH ENERGY EACH FOOD GIVES US.

WHAT WOULD HAPPEN IF YOU ATE FOODS THAT JUST HAD A LOT OF ENERGY OR CALORIES BUT NOT MUCH ELSE?

ON YOUR CARDS YOU WILL FIND A PLACE THAT INDICATES WHETHER THE FOOD IS HIGH IN ENERGY OR LOW IN ENERGY.

THIS TIME WHEN WE PLAY THE GAME YOU WANT TO MAKE SURE THAT YOU DON'T HAVE ALL HIGH-ENERGY FOODS OR ALL LOW-ENERGY FOODS, BUT SOME OF EACH. NOW, IN ORDER TO WIN, YOU MUST HAVE THREE MEALS LAID DOWN, THE RIGHT NUMBER FROM EACH FOOD GROUP, AND THESE MUST INCLUDE AT LEAST THREE HIGH-ENERGY FOODS AND THREE LOW-ENERGY FOODS. IF YOU HAVE MORE, FINE, BUT YOU MUST HAVE AT LEAST THREE OF EACH.



## TEACHING STRATEGIES

the winners, group these together so that they challenge and so others can be winners in the game. The group of winners might like to add and Low-Energy rules to their games. The next time the game is played, return the worksheets you have. It contains a second score sheet that can be

to demonstrate a complete understanding of the game having no great difficulty playing it, when they play the game add Energy to the rules. Variations of the game may be played on succeeding

the rules for adding Energy to the game, Worksheet 3-15 and project Slide 3-27. Say:

THINKING WE DID NOT CONSIDER WHEN PLAYING THE GAME AND PLANNING DAILY MEALS WAS HOW MUCH ENERGY EACH FOOD GIVES US.

WHAT COULD HAPPEN IF YOU ATE FOODS THAT HAD A LOT OF ENERGY OR CALORIES BUT NOT MUCH ELSE?

FOR CARDS YOU WILL FIND A PLACE THAT TELLS WHETHER THE FOOD IS HIGH IN ENERGY OR LOW IN ENERGY.

THE NEXT TIME WHEN WE PLAY THE GAME YOU WANT TO REMEMBER THAT YOU DON'T HAVE ALL HIGH-ENERGY OR ALL LOW-ENERGY FOODS, BUT SOME OF EACH. IN ORDER TO WIN, YOU MUST HAVE THREE CARDS LAID DOWN, THE RIGHT NUMBER FROM EACH GROUP, AND THESE MUST INCLUDE AT LEAST TWO HIGH-ENERGY FOODS AND THREE LOW-ENERGY FOODS. IF YOU HAVE MORE, FINE, BUT YOU MUST HAVE AT LEAST THREE OF EACH.

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-13

117

Students:

--infer, "You'd get fat," "Get sick," "It wouldn't be healthy."

ACTIVITY 3-13

118

### MATERIALS

### TEACHING STRATEGIES

A demonstration might be necessary.

Make the card game available for use during free periods, homerooms, etc.

DEMONSTRATION

GAME

## TEACHING STRATEGIES

ration might be necessary.

DEMONSTRATE



GAME TIME

card game available for use during free periods,  
etc.

## ANTICIPATED STUDENT BEHAVIORS

Teacher \_\_\_\_\_  
Date \_\_\_\_\_

UNIT III, CORE B  
TALLYSHEET 3-7: Success on the Full and Healthy Game - Worksheet 3-14  
ACTIVITY 3-13: "A Winner Is Full And Healthy"

This tallysheet will help you identify students who do not understand the game or are less successful than others. The next time the game is played you may want to group the winners together to give them more challenge or allow others to win in the other groups.

In column 1 circle yes if your observation and the way the scorecard is filled out indicate that the student understands the game. If he has won a game, he probably understands it. Circle no if you observed that the student did not know how to play it or his score sheet is not filled out right.

In column 2, circle the number of games played.

In column 3, circle the number of times he was a winner.

In column 4, enter the number of foods the student had played in the last completed game. This information may not have much meaning for you, but might help BSCS learn more about and improve the game.

KEY:	1		2						3						4					
	yes	no	1	2	3	4	5	6	7	1	2	3	4	5	6	7	Meat	Dairy	Fruit & Veg.	Breads
Attach ID list here.	yes	no	1	2	3	4	5	6	7	1	2	3	4	5	6	7				
	yes	no	1	2	3	4	5	6	7	1	2	3	4	5	6	7				
	yes	no	1	2	3	4	5	6	7	1	2	3	4	5	6	7				
	yes	no	1	2	3	4	5	6	7	1	2	3	4	5	6	7				
	yes	no	1	2	3	4	5	6	7	1	2	3	4	5	6	7				
	yes	no	1	2	3	4	5	6	7	1	2	3	4	5	6	7				
	yes	no	1	2	3	4	5	6	7	1	2	3	4	5	6	7				
	yes	no	1	2	3	4	5	6	7	1	2	3	4	5	6	7				
	yes	no	1	2	3	4	5	6	7	1	2	3	4	5	6	7				
	yes	no	1	2	3	4	5	6	7	1	2	3	4	5	6	7				



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[illegible]

UNIT III, CORE B  
ACTIVITY 3-13: "A Winner Is 'Full And Healthy'"

Activity name suggested by class:

Teacher

BSCS USE:		Post		Tally		Rev	
Day 1	Day 2	Day 3	Day 4	Day 5	Day 6		

	Date taught (month and date, e.g. 11/2)						
1.	Minutes of class time on science each day						
2.	Minutes of preparation each day						
3.	Students absent on each date (Use ID Number)						
4.							

5. Interest of class as expressed by apparent attention to what is happening.Number of students responding with: Name students you noted especially:  
(Number)

HIGH INTEREST	→	
MODERATE INTEREST	→	
INDIFFERENCE	→	
MODERATE RESISTANCE	→	
STRONG DISLIKE	→	
HARD TO RATE	→	

6. Equipment in kit: ☐ None ☐ Satisfactory ☐ Too fragile ☐ Too complicated to use ☐ Difficult to use
7. Equipment I got: ☐ None ☐ Easy to get but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

Materials used:	Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:
10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:
11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:
12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?
13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:
14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:

☐ Worthwhile☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless--keep as is ☐ revision suggested ☐ major changes described ☐ --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

needed ☐ None ☐ Easy ☐ Hard to get, ☐ Hard to get, ☐ Unobtainable, ☐ Difficult  
needed to get but okay add to kit add to kit

8. Materials used:

Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is						
Revise slightly						
Revise much						
Worthless: omit						

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:
10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:
11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:
12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?
13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:
14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:
15. Your rating of this activity:  
☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless  
--keep as is revision suggested major changes described --drop it
- SPECIFIC CONCERNS ABOUT THIS ACTIVITY:
16. There are always parts of activities that are good and need not be changed.  
What parts of this activity should be retained when the curriculum is revised?  
Page(s) \_\_\_\_\_:

17. Were your students unfamiliar with some of the foods in the "Full and Healthy" game?  
☐ No ☐ Yes: Which ones and what did you do?
18. How many students were able to play the game using the Energy rules?  
☐ None ☐ 1/2 ☐ 3/4 ☐ All: Comment.
19. Please complete Tallysheet 3-7 of Worksheet 3-14 showing student success playing the "Full and Healthy" game and send it in with this worksheet.
20. Concern (or questions) about content:
21. Messages for staff (read immediately):

BSCS Evaluation: EMH Feedback Form 1c

UNIT III, CORE B  
ACTIVITY 3-13: "A Winner Is 'Full And Healthy'"

Teacher \_\_\_\_\_

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. This of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.





## Me and my Environment

### OBJECTIVE FOCUS FOR THIS ACTIVITY

#### UNIT GOALS:

1. Realize and appreciate the energy inter-relationships between organisms.

#### CORE B OBJECTIVES:

1. Recognize that food is our main source of energy.
2. Appreciate that being alive is a dynamic state requiring energy.
3. Determine that different foods have different amounts of energy.
4. Determine that increased activity requires an increased amount of energy.
5. Realize that maintaining one's health requires eating foods which fulfill nutritional needs in addition to energy needs.

### MATERIALS

Worksheet 3-16  
\*35mm Slide Projector  
Slide 3-28 and 3-29

\*Not furnished in materials kit

### TEACHING STRATEGIES

#### Activity 3-14. Popeye's Quick Energy -- Review Of Success

*This activity provides a review of the concepts of energy and food and how the two are interrelated.*

Begin by distributing Worksheet 3-16. As students read silently, read the story aloud in a dramatic and/or humorous manner.

FOCUS FOR THIS ACTIVITY

## GOALS:

1. Realize and appreciate the energy inter-relationships between organisms.

## OBJECTIVES:

1. Recognize that food is our main source of energy.
2. Appreciate that being alive is a dynamic state requiring energy.
3. Determine that different foods have different amounts of energy.
4. Determine that increased activity requires an increased amount of energy.
5. Realize that maintaining one's health requires eating foods which fulfill nutritional needs in addition to energy needs.

## TEACHING STRATEGIES

14. Popeye's Quick Energy -- Review Of Success

ty provides a review of the concepts of food and how the two are interrelated.

distributing Worksheet 3-16. As students read read the story aloud in a dramatic and/oranner.

## UNIT III.

ENERGY RELATIONSHIPS  
IN MY ENVIRONMENT

## CORE B.

## ENERGY IN FOOD



BSCS

## ACTIVITY 3-14.

POPEYE'S QUICK ENERGY --  
REVIEW OF SUCCESS

## ANTICIPATED STUDENT BEHAVIORS

*At the end of this activity, each student should:*

*--have selected a correct answer to each of the four questions on Worksheet 3-16.*

## MATERIALS

## TEACHING STRATEGIES



## POPEYE'S QUICK ENERGY

"HELP, HELP." POPEYE HEARD OLIVE OYL'S DISTANT CRIES. HE LOOKED OUT THE DOOR JUST IN TIME TO SEE HER DISAPPEAR DOWN THE HILL UNDER THE ARM OF HIS ARCH RIVAL, BRUTUS.

"I MUST BE QUICK," THOUGHT POPEYE, "OR BRUTUS WILL HAVE VANISHED WITH MY SWEET OLIVE OYL AND I MAY NEVER FIND HER AGAIN." POPEYE TURNED TO HIS CAN OF SPINACH. "MY SUPPLY IS GONE!!" HE GROANED. "HELP! WHAT SHALL I DO? IN JUST FIVE SHORT MINUTES SHE WILL BE GONE FOREVER!!" QUICK-THINKING POPEYE LOOKED AT HIS EVER-HANDY CALORIE BOOK:

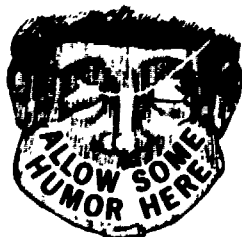
CALORIE BOOKFOODCALORIES PER SERVING

Baked Beans	135
Bread	64
Milk	90
Oranges	30
Peanuts	174
Sugar	116
Syrup	76
T-bone steak	200
Carrots	20

"AH, HERE IT IS AT LAST--JUST WHAT I NEED!" WITH THE SPEED OF LIGHTNING HE RAN TO HIS

## TEACHING STRATEGIES

## ANTICIPATED STUDENT BEHAVIORS



### POPEYE'S QUICK ENERGY

HELP." POPEYE HEARD OLIVE OYL'S DISTANT  
HE LOOKED OUT THE DOOR JUST IN TIME TO  
R DISAPPEAR DOWN THE HILL UNDER THE ARM  
ARCH RIVAL, BRUTUS.

T BE QUICK," THOUGHT POPEYE, "OR BRUTUS  
AVE VANISHED WITH MY SWEET OLIVE OYL AND  
NEVER FIND HER AGAIN." POPEYE TURNED TO  
N OF SPINACH. "MY SUPPLY IS GONE!!" HE  
D. "HELP! WHAT SHALL I DO? IN JUST FIVE  
MINUTES SHE WILL BE GONE FOREVER!!" QUICK-  
NG POPEYE LOOKED AT HIS EVER-HANDY  
E BOOK:

### CALORIE BOOK

#### CALORIES PER SERVING

Beans	135
	64
	90
	30
	174
	116
	76
steak	200
	20

ERE IT IS AT LAST--JUST WHAT I NEED!"  
E SPEED OF LIGHTNING HE RAN TO HIS

## MATERIALS

**Slide 3-28**

**Worksheet 3-16 (Front)**[illegible]

## TEACHING STRATEGIES

CUPBOARD, GRABBED THE HIGHEST ENERGY FOOD, AND ATE IT UP. AHA! WHAT ENERGY!! HE FELT HIS MUSCLES BEGIN TO POP. SUDDENLY HE DASHED OFF, RUNNING AS FAST AS A BULLET TO RESCUE OLIVE. JUST IN THE NICK OF TIME, HE PASSED OVER THE HEAD OF BRUTUS, SWOOPED UP OLIVE OYL, AND DISAPPEARED INTO THE DISTANCE WITH HER.

Next, project Slide 3-28 and read aloud the questions on the back of the worksheet.

**Allow time for the students to answer them individually.**

1. POPEYE WANTED TO EAT FOOD BEFORE TRYING TO RESCUE OLIVE OYL BECAUSE HE KNEW FOOD CONTAINS \_\_\_\_\_.
2. WHICH FOOD ON THE CALORIE CHART DID POPEYE CHOOSE FOR THE MOST "GO POWER"?
3. WHY DID YOU SAY THIS FOOD HAS THE MOST "GO POWER"?
4. WHICH WOULD YOU HAVE TO EAT THE MOST OF TO GET THE SAME AMOUNT OF ENERGY?
5. IN ORDER FOR POPEYE TO CONTINUE TO BE STRONG DAY AFTER DAY, WHICH MEAL SHOULD HE EAT?

Collect the worksheets, then read the questions aloud. Ask for volunteers to answer each question. When the

## TEACHING STRATEGIES

POPEYE, GRABBED THE HIGHEST ENERGY FOOD,  
HE LIFTED IT UP. AHA! WHAT ENERGY!! HE FELT  
MUSCLES BEGIN TO POP. SUDDENLY HE DASHED  
RUNNING AS FAST AS A BULLET TO RESCUE  
OLIVE OYL. JUST IN THE NICK OF TIME, HE PASSED  
THE HEAD OF BRUTUS, SWOOPED UP OLIVE OYL,  
AND DISAPPEARED INTO THE DISTANCE WITH HER.

Present Slide 3-28 and read aloud the questions on  
the worksheet.

Allow time for the students to answer them individually.

WHICH FOOD DID POPEYE WANT TO EAT BEFORE TRYING TO  
RESCUE OLIVE OYL BECAUSE HE KNEW FOOD  
CONTAINS \_\_\_\_\_.

WHICH FOOD ON THE CALORIE CHART DID POPEYE  
CHOOSE FOR THE MOST "GO POWER"?

WHY DID YOU SAY THIS FOOD HAS THE MOST "GO  
POWER"?

WHICH WOULD YOU HAVE TO EAT THE MOST OF TO  
GET THE SAME AMOUNT OF ENERGY?

IN ORDER FOR POPEYE TO CONTINUE TO BE  
STRONG DAY AFTER DAY, WHICH MEAL SHOULD  
HE EAT?

Use the worksheets, then read the questions aloud.  
Allow volunteers to answer each question. When the

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-14

(121)

Students:

--read worksheet silently.

--answer questions.

--respond, "Energy," "Calories," or "Power to do  
work."

--study the energy chart and insert "Steak" in the  
blanks on their worksheets.

--study the sample responses on their worksheets  
and mark "Because more energy is in it."

--study the energy chart and mark "oranges" on  
their worksheets.

--study the menus and mark "carrots, milk, steak,  
and bread."

# ACTIVITY 3-14

122

## MATERIALS

Slide 3-29

Worksheet 3-16 (Back)

3. WHY DID YOU SAY THIS FOOD HAS THE MOST "GO POWER"?

A. BECAUSE I LIKE IT

B. BECAUSE IT COSTS MORE

C. BECAUSE MORE ENERGY IS IN IT

D. BECAUSE THERE IS MORE OF IT

WRITE IN 1 ON YOUR CHOICE

4. WHICH WOULD YOU HAVE TO EAT THE MOST OF TO GET THE SAME AMOUNT OF ENERGY?

A. BAKED BEANS

B. BRUSSELS

C. STEAM

D. BREAD

WRITE IN 2 ON YOUR CHOICE

5. AN UNCLE FOR PUPPET TO COME TO BE STRONG CAN AFTER HIM WHICH MEAL SHOULD HE EAT?

A. CARROTS BEANS BRUSSELS	B. CARROTS PEAS STEAM BREAD	C. SUGAR SYRUP MILK CARROTS	D. PEANUTS STEAM PEAS SUGAR
---------------------------------	--------------------------------------	--------------------------------------	--------------------------------------

WRITE IN 3 ON YOUR CHOICE

## TEACHING STRATEGIES

class agrees on an answer, have the students write the correct word or words in the space provided.

Complete Tallysheet 3-8 and note which students are having difficulty and assist them individually, reviewing those concepts with which they are having trouble.

### TEACHING STRATEGIES

es on an answer, have the students write the  
rd or words in the space provided.

allysheet 3-8 and note which students are having  
and assist them individually, reviewing those  
with which they are having trouble.

### ANTICIPATED STUDENT BEHAVIORS



Teacher \_\_\_\_\_  
Date \_\_\_\_\_

## UNIT III, CORE B

TALLYSHEET 3-8: Tally of Worksheet 3-16

### ACTIVITY 3-14: "Review Of Success"

**Tally each student's responses to Worksheet 3-16 as indicated below.**

Question 1. While the word "Energy" is the expected answer, "Calories," or "Power to do work" would also be correct. Make a check mark in the appropriate column, or if another response such as "power to do work" is given, please write it in.

**Question 2.** Check the column to indicate which food was selected. If a student has chosen a food not listed, write it down in the "Other" column.

**Question 3.** See back of this tallysheet for Questions 3, 4, and 5.

[illegible]

**Question 3.** See back of this tallysheet for Questions 3, 4, and 5.

[illegible]

**TALLY SHEET 3-8: Tally of Worksheet 3-16**

Question 3. The options will be referred to from top to bottom as A B C D. Choice C, "Because more energy is in it," is the best answer. Students who chose this response should also have chosen Steak as the answer to Question 2.

Question 4. The options from left to right will be referred to as A B C D. Choice B, "Oranges," is the best answer.

Question 5. The options from left to right will be referred to as A B C D. Choice D, "Carrots, Milk, Steak, Bread" is the best response. Review if necessary and provide continuing opportunities to play the "Full and Healthy" game.

[illegible]

Does this review give an accurate indication of student understanding?  
If not, what other evidence do you have of student learning?

☐ Yes ☐ No

UNIT III, CORE B  
ACTIVITY 3-14: "Review Of Success"

Activity name suggested by class: \_\_\_\_\_

	Teacher					
	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
Date taught (month and date, e.g. 11/2)						
Minutes of class time on science each day						
Minutes of preparation each day						
Students absent on each date (Use ID Number)						

BSCS USE: Post \_\_\_\_\_ Tally \_\_\_\_\_ Rev \_\_\_\_\_

1.	Date taught (month and date, e.g. 11/2)					
2.	Minutes of class time on science each day					
3.	Minutes of preparation each day					
4.	Students absent on each date (Use ID Number)					

5. Interest of class as expressed by apparent attention to what is happening.Number of students responding with: \_\_\_\_\_ Name students you noted especially: \_\_\_\_\_  
(Number)

HIGH INTEREST	_____
MODERATE INTEREST	_____
INDIFFERENCE	_____
MODERATE RESISTANCE	_____
STRONG DISLIKE	_____
HARD TO RATE	_____

6. Equipment in kit: ☐ None ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use7. Equipment I got: ☐ None ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

Materials used:	Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:

☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless  
--keep as is revision suggested major changes described --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

Equipment I got: ☐ None ☐ Easy ☐ Hard to get, ☐ Hard to get, ☐ Unobtainable,  
needed to get but okay add to kit add to kit

fragile complicated to use

Materials used:	Worksheet #   #   #	Game #	Slides (show slide nos.)	Transparency #   #   #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:

☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless  
--keep as is revision suggested major changes described --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed.  
What parts of this activity should be retained when the curriculum is revised?  
Page(s) \_\_\_\_\_:

17. Please tally each student's responses to Worksheet 3-16 on Tallysheet 3-8 and send it in with this worksheet.

18. Concern (or questions) about content:

19. Messages for staff (read immediately):

BSCS Evaluation: EMH Feedback Form 1c

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

PAGE A

UNIT III, CORE B  
ACTIVITY 3-14: "Review Of Success"

Teacher \_\_\_\_\_

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.

UNIT III  
REACTIONS TO CORE B

1. Was the background information for this core adequate? ☐ Yes ☐ No  
Comment:
2. Was it clear to you why these particular activities were chosen and the direction they were leading? ☐ Yes ☐ No  
Comment:
3. Did the activities fulfill the purposes stated in the Guide for this core? ☐ Yes ☐ No  
Comment:
4. How would you increase the clarity of this core for students? (Help them understand why they are doing these activities.)
5. Is there a practical (take-home) value for your students in these activities? ☐ Yes ☐ No  
6. If yes, what do you see as the "take-home" lesson? If no, what is needed?
7. In these materials, what things did your students find difficult to do?
8. Should there be more clues to success or reviews of success in this core? ☐ Yes ☐ No  
Comment:
9. Was there too much reading and too many teacher directions? ☐ Yes ☐ No  
Comment:
10. Did you make use of the Planning Guide? ☐ Yes ☐ No  
Comment:



5. Is there a practical (take-home) value for your students in these activities? ☐ Yes ☐ No  
6. If yes, what do you see as the "take-home" lesson? If no, what is needed?

7. In these materials, what things did your students find difficult to do?

8. Should there be more clues to success or reviews of success in this core? ☐ Yes ☐ No  
Comment:

9. Was there too much reading and too many teacher directions? ☐ Yes ☐ No  
Comment:

10. Did you make use of the Planning Guide? ☐ Yes ☐ No  
Comment:

11. If you could teach your way, rather than following the Guide, how would you do it?

12. Which of your students do you believe were unsuccessful in achieving the objectives of this core of activities? Explain.

BSCS Evaluation: EMH Feedback Form 2a

SIDE A

# NEW STUDENTS ENTERING DURING THIS CORE

Date Entered	Last Name	Name Used	Ethnic Group	Sex	Birthdate	Test date	Test	Total
			W B S O	M F			W B O	
			W B S O	M F			W B O	
			W B S O	M F			W B O	
			W B S O	M F			W B O	

## STUDENTS DROPPED IN THIS PERIOD

Date Dropped	Last Name	First

W = white  
 B = black  
 S = Spanish-American  
 O = other

W = WISC  
 B = Binet  
 O = other (name)

ADDITIONAL INFORMATION ON NEW STUDENTS:

NEW STUDENTS ENTERING DURING THIS CORE

c Group	Sex	Birthdate	Test date	Test	Total	Verbal	Performance	Previous Test Score
S O	M F			W B O				
S O	M F			W B O				
S O	M F			W B O				
S O	M F			W B O				

White  
Black  
Spanish-  
American  
Other

W = WISC  
B = Binet  
O = other  
(name)



## Me and my Environment

### UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT CORE C. ENERGY FLOW THROUGH FOOD CHAINS AND WEBS

#### AIMS FOR ME AND MY ENVIRONMENT

1. DEVELOPMENT IN EACH CHILD OF A SENSE OF IDENTITY AS A PERSON WHO HAS SOME DEGREE OF CONTROL OVER AND CAN ACT ON HIS ENVIRONMENT. This will lead to a degree of self-determination based on a rational coping with situations rather than on a passive compliance or an impulsive response to problems.
2. DEVELOPMENT IN EACH CHILD OF A SUCCESS SYNDROME. More than anything else, each activity is intended to be a success experience for each child. It is the teacher's responsibility -- almost obligation -- to see that each child succeeds at a level that is challenging to his abilities and that preserves his self-respect. It is a further responsibility of the teacher to point out his achievement. The students as a group should help each individual fit what he has done into a pattern of accomplishment.
3. DEVELOPMENT IN EACH CHILD OF AN INTEREST THAT COULD BECOME A HOBBY OR AVOCATION OVER A LIFETIME (through an exposure to an array of experiences in science). It is hoped that many children will find some area -- perhaps growing plants, caring for animals, identifying flowers, collecting things, or simply enjoying outings into the country -- that they feel strongly about and can develop some competence or knowledge in. This would provide a means of self-expression, and (perhaps) allow some degree of sharing or involvement with others.
4. DEVELOPMENT IN EACH CHILD OF A SENSE OF RELATIONSHIP AND EMPATHY WITH OTHER LIVING THINGS. It is hoped that this will lead to a positive regard and caring about what affects them as individuals and as a group, because what affects them affects the community of man.
5. DEVELOPMENT IN EACH CHILD OF AN UNDERSTANDING OF ENVIRONMENTAL CONDITIONS that will lead to a sense of responsibility for the environment and actions that protect or improve it.

1. Realize and appreciate the energy relationships in the environment.
2. Appreciate and understand man's energy relationships in the environment.

#### OBJECTIVES

1. Realize that food is the only source of energy for most organisms.
2. Realize that food can be traced to its source.
3. Realize that all food chains begin with a source of energy.
4. Appreciate that man and all other animals depend upon plants for food.
5. Trace a food to its source.
6. Construct food chains and webs.
7. Know that energy flows from one organism to another in a food chain.
8. State the sources of food for various organisms.
9. Appreciate the interrelationships between organisms in a community.
10. Understand the consequences that result from the removal of an organism from a community.

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT  
CORE C. ENERGY FLOW THROUGH FOOD CHAINS AND WEBS



BSCS

UNIT III GOALS

1. Realize and appreciate the energy interrelationships between organisms.
2. Appreciate and understand man's dependence on green plants for food.

OBJECTIVES OF CORE C

1. Realize that food is the only source of energy for man and all other animals.
2. Realize that food can be traced to a plant source.
3. Realize that all food chains begin with a green plant.
4. Appreciate that man and all other animals are directly or indirectly dependent upon plants for food.
5. Trace a food to its source.
6. Construct food chains and webs.
7. Know that energy flows from one kind of organism to another kind of organism in a food chain.
8. State the sources of food for various organisms.
9. Appreciate the interrelationships of organisms in a food web.
10. Understand the consequences that the removal of an organism has on a food web.



## Me and my Environment

### UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT CORE C. ENERGY FLOW THROUGH FOOD CHAINS AND WEBS

#### CORE C RATIONALE

The students have learned that energy is the driving force which makes all movement or change possible. They have also learned that food supplies them with their energy requirements. Regardless of what kind of animal you may consider, each is faced with a similar problem--in order to survive it must have a source of food to satisfy its energy needs.

A main purpose of this core is to impress on the student that the life of every living thing is affected by the lives of other living things. Nowhere is this relationship more obvious than in the area of nutrition, for most interactions between living things involve food. If a deer does not have grass or browse on which to feed, it dies. Without deer a mountain lion would be in danger of starvation. If alternate sources of food were not readily available, such as rabbits, it too would die. Activities in Core C are designed to show that the role or fate of any organism is directly or indirectly related to its eating habits.

Within any community one will find plants, plant eaters, animal eaters, and other organisms feeding on both plants and animals. The relationship between organisms in an environmental community is best expressed as a food chain.

What is not apparent to many people is that each food chain has a plant in some form as the beginning link in the chain. The foods of all animals, including man, can be traced to plants, and therefore, ultimately to the sun. The development of this concept begins in Activity 3-15 (My Source Of Food) by having the student trace the ingredients of a commonly eaten food item, a hamburger, to their source. The student finds that all foods do, indeed, have a plant origin. That all foods can ultimately be traced to the sun will be developed in the following core.

#### BACK

Since animals, obtain their energy from a plant. That all food in tracing the source (Source Of Food). It is a difference between the food chain dealt with basically derived from from a cow, tomato from energy is from one organism a hawk. This difference may not be apparent in sense that the others tant in maintaining a contribute to the growth of fats, and proteins.

In Activity 3-16 illustrate that organisms. Those organisms referred to as herbivores. Carnivores are animals animal eaters. Man is plants and animals. Food to as plant and animal.

The feeding relationship community is termed a community. It is illustrated by an example. A student is made aware that a snake kills a frog for dinner. A frog, which in turn has been feeding on grass.

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT  
CORE C. ENERGY FLOW THROUGH FOOD CHAINS AND WEBS



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BACKGROUND INFORMATION FOR THE TEACHER

driving force which  
also learned that food  
regardless of what kind  
similar problem--in  
satisfy its energy

the student that the  
es of other living  
than in the area of  
things involve food.  
to feed, it dies.  
starvation. If  
le, such as rabbits,  
ed to show that the  
ctly related to its

plant eaters, animal  
and animals. The  
community is best

each food chain has a  
ain. The foods of  
s, and therefore,  
concept begins in  
udent trace the  
rger, to their source.  
a plant origin. That  
be developed in the

Since animals, including man, do not make their own food, they must obtain their energy by eating a plant or another animal that has eaten a plant. That all food eaten can be traced to plants is readily apparent in tracing the source of the parts of a hamburger in Activity 3-15 (My Source Of Food). It is important for you as a teacher to note the subtle difference between the food source dealt with in this activity and the food chain dealt with in future activities. In a food source, a food is basically derived from the same organism, e.g., milk from a cow, butter from a cow, tomato from a tomato plant. In a food chain, the transfer of energy is from one organism to another, e.g., from a mouse to a snake to a hawk. This differentiation is made in Activities 3-16 and 3-17. What may not be apparent is that some of the ingredients are not food in the sense that the others are. Such things as salt and water, while important in maintaining a properly functioning body, do not supply energy or contribute to the growth and repair of body tissue as do carbohydrates, fats, and proteins.

In Activity 3-16 (Who Eats Whom?) examples have been selected to illustrate that organisms unable to make their own food eat other organisms. Those organisms which feed on plants, while technically referred to as herbivores, are referred to here as plant eaters. Carnivores are animals which eat other animals and are referred to as animal eaters. Man is an example of an omnivore, one who eats both plants and animals. For the sake of simplicity, omnivores are referred to as plant and animal eaters.

The feeding relationship among animals within an environmental community is termed a food chain. Such a relationship is best illustrated by an example. In Activity 3-17 (The Food Chain Game) the student is made aware of a chain that has a hawk at one end. The hawk kills a snake for dinner. The snake only a short time before had eaten a frog, which in turn had dined on a grasshopper. The grasshopper had been feeding on grass.



## Me and my Environment

### UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT CORE C. ENERGY FLOW THROUGH FOOD CHAINS AND WEBS

#### CORE C RATIONALE (continued)

To function in a positive way in the natural world, and to understand it, the student must realize that a food chain represents only an isolated strand in a more complicated network of feeding relationships that exists in each environmental community. One organism may serve as a link in several food chains. Since food chains are interconnected, the feeding relationships can be thought of as a food web. Before he can appreciate these relationships the student must be familiar with what particular animals normally eat. This is accomplished in Activity 3-16 (Who Eats Whom?) where the eating habits of a selected group of animals are examined. Putting this newly gained knowledge to use, the student is given the opportunity to construct many food chains by playing the Food Chain Game in Activity 3-17. The complexity of food chains is then made apparent by the construction of several food webs in Activity 3-18 (Construction Of A Food Web). The worksheet constructed by the students in this last activity dramatically illustrates the far-reaching interdependence of individuals in the food web.

These food interrelationships are fundamental in establishing the kinds and numbers of organisms in a community. Man, because he is an integral part of numerous chains, and because he has the potential to affect so many others, must recognize the many invisible threads which tie him to the natural world. In Activity 3-18 the concept is also introduced that any reduction, addition, or change in the size of a population within a web can have dramatic consequences. This concept is developed more fully in Unit V. Activity 3-19 (Nature's Delicate Balance--Review Of Success) provides a review and opportunity for applying the concepts in this core by writing a story to fit a picture booklet on the interrelationships of living things.

#### BACKGROUND

The above example is less than others. It starts with a green plant.

If most or all of the organisms in one another, the result is a community. A food web is more than does a food chain. An example depends on the food chain. If a fox eats the hawk and the frog, the animals are part of a food web. Up what is called a food web. It is provided for the student. (Of A Food Web). The concept is reinforced through the Delicate Balance--Review. Students develop the living organisms such





BSCS

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT  
CORE C. ENERGY FLOW THROUGH FOOD CHAINS AND WEBS

BACKGROUND INFORMATION FOR THE TEACHER (continued)

The above example involves more organisms than some food chains and less than others. All, however, have one thing in common--they start with a green plant.

If most or all of the chains are examined together as they relate to one another, the result is a weblike arrangement within the environmental community. A food web expresses a far more complex set of relationships than does a food chain. To illustrate, the hawk population in the above example depends on the survival of all other populations in the food chain. If a fox eats the snake, or a mouse eats the grasshopper, then the hawk and the frog would need to look elsewhere for food. These animals are part of several different interrelated food chains, making up what is called a food web. Further clarification of food webs is provided for the students in the examples in Activity 3-18 (Construction Of A Food Web). The interdependence of plants and animals in a food web is reinforced through creative storytelling in Activity 3-19 (Nature's Delicate Balance--Review Of Success). In a pamphlet without words, students develop their own story, integrating the delicate balance among living organisms such as men, mountain lions, deer, and green plants.

al world, and to  
food chain represents  
network of feeding  
community. One  
ains. Since food chains  
can be thought of as a  
ionships the student must  
ly eat. This is accom-  
the eating habits of a  
g this newly gained  
rtunity to construct  
in Activity 3-17:  
rent by the construction  
tion Of A Food Web).  
is last activity  
dependence of individuals


tal in establishing the  
Man, because he is an  
e has the potential to  
invisible threads which  
the concept is also intro-  
n the size of a population  
his concept is developed  
Delicate Balance--Review  
or applying the concepts  
e booklet on the inter-



## Me and my Environment

### UNIT III CORE C

## PLANNING GUIDE


NOTE: Some activities (indicated in italics and an  in the margin) should be prepared several days or weeks in advance. Use this to develop a teaching and preparation schedule. All supplies needed for each activity are listed in the table.

Activity Number, Page, Tentative Teaching Date	Check List of Supplies Needed		(Italics and pencil icon in margin)
	Materials You Furnish	Materials in Supply Kit	
3-15. My Source Of Food  Page _____ Date planned _____	Overhead projector	Transparency 3-3 Transparency 3-4	Tracing The Source Terminal Sources
3-16. Who Eats Whom?  Page _____ Date planned _____	35mm Slide projector	Animal flash cards Slide 3-30 Slide 3-31	One deck Kangaroo Kangaroo eating
3-17. The Food Chain Game  Page _____ Date planned _____		Animal flash cards Game - Food Chain	One deck Four decks of cards
3-18. Construction Of A Food Web  Page _____ Date planned _____	Pieces of heavy corrugated cardboard  Colored rubber bands Colored chalk 35mm Slide projector		Four pieces 8 1/2 x 11 boxes well in advance About twenty-five One box

## PLANNING GUIDE



**BSCS**

Activities (indicated in *italics* and an  in the margin) must be prepared several days or weeks in advance. Use this summary as a teaching and preparation schedule. All supplies needed are listed.


List of Supplies Needed		Notes and Suggestions to Teacher ( <i>Italics and Arrow Indicate Advance Preparation Directions</i> )
Activity	Materials in Supply Kit	
	Transparency 3-3 Transparency 3-4	Tracing The Source of a Hamburger Terminal Sources of a Hamburger
	Animal flash cards Slide 3-30 Slide 3-31	One deck Kangaroo Kangaroo eating
	Animal flash cards Game - Food Chain	One deck Four decks of cards
Needed		Four pieces 8 1/2" X 11" for each pair of students. Collect old boxes well in advance in order to have enough cardboard. About twenty-five per pair of students One box



## Me and my Environment

### UNIT III CORE C

## PLANNING GUIDE


NOTE: Some activities (indicated in italics and an  in the margin) should be prepared several days or weeks in advance. Use this guide to develop a teaching and preparation schedule. All supplies needed for each activity are listed.

Activity Number, Page, Tentative Teaching Date	Check List of Supplies Needed		<i>(Italics and arrow icon)</i>
	Materials You Furnish	Materials in Supply Kit	
3-18. Construction Of A Food Web (Continued)		Animal flash cards Worksheet 3-17 Worksheet 3-18 Slide 3-32 Slide 3-33 Slide 3-34	One deck Food Web A Food Web B Sample food web Worksheet 3-17 Worksheet 3-18
3-19. Nature's Delicate Balance--Review Of Success  Page _____ Date planned _____	35mm Slide projector	Worksheet 3-19 Slide 3-35 Slide 3-36 Booklet <i>Nature's Delicate Balance</i>	Review Of Success Review Of Success Review Of Success  One per student

## PLANNING GUIDE



**BSCS**

Activities (indicated in italics and an  in the margin) must be prepared several days or weeks in advance. Use this summary as a teaching and preparation schedule. All supplies needed are listed.

List of Supplies Needed	Notes and Suggestions to Teacher ( <i>Italics and Arrow Indicate Advance Preparation Directions</i> )
<p>h</p> <p>Materials in Supp<sup>1</sup> / Kit</p> <p>Animal flash cards Worksheet 3-17 Worksheet 3-18 Slide 3-32 Slide 3-33 Slide 3-34</p>	<p>One deck Food Web A Food Web B Sample food web Worksheet 3-17 Worksheet 3-18</p>
<p>Worksheet 3-19 Slide 3-35 Slide 3-36 Booklet <i>Nature's Delicate Balance</i></p>	<p>Review Of Success Review Of Success Question 1 Review Of Success Question 2  One per student</p>



## Me and my Environment

### OBJECTIVE FOCUS FOR THIS ACTIVITY

#### UNIT GOALS:

1. Realize and appreciate the energy inter-relationships between organisms.
2. Appreciate and understand man's dependence on green plants for food.

#### CORE C OBJECTIVES:

1. Realize that food is the only source of energy for man and all other animals.
2. Realize that food can be traced to a plant source.
5. Trace a food to its source.
6. Construct food chains and webs.

### MATERIALS

### TEACHING STRATEGIES

#### Activity 3-15. My Source Of Food

*By tracing food chains to their source, the students will infer that plants are the source of energy in the food they consume. This is an important concept in the development of subsequent activities.*

FOCUS FOR THIS ACTIVITY

**GOALS:**

1. Realize and appreciate the energy inter-relationships between organisms.
2. Appreciate and understand man's dependence on green plants for food.

**OBJECTIVES:**

1. Realize that food is the only source of energy for man and all other animals.
2. Realize that food can be traced to a plant source.
5. Trace a food to its source.
6. Construct food chains and webs.

**TEACHING STRATEGIES**

3-15. My Source Of Food

ing food chains to their source, the students will  
at plants are the source of energy in the food  
sume. This is an important concept in the  
ent of subsequent activities.

**UNIT III.**

**ENERGY RELATIONSHIPS  
IN MY ENVIRONMENT**

**CORE C.**

**ENERGY FLOW THROUGH  
FOOD CHAINS AND WEBS**

**ACTIVITY 3-15.**

**MY SOURCE OF FOOD**



**BSCS**

**ANTICIPATED STUDENT BEHAVIORS**

*At the end of this activity, each student should:*

- have suggested where the energy in food comes from.
- have participated in identifying the ingredients of a hamburger.
- have used the word "source" appropriately.
- have discovered that all of the hamburger ingredients came previously from plants.
- have traced at least one other food product to plants.
- have stated that he is dependent on plants for his food.

# ACTIVITY 3-15

## MATERIALS

## TEACHING STRATEGIES

128

Transparency 3-3  
Transparency 3-4  
\*Overhead projector

### Teacher Preparation:

1. Have the overhead projector set up and ready to use.
2. Familiarize yourself with the transparencies.

Have the students recall the Popeye Story (Activity 3-14) and ask:

WHY DID POPEYE GO TO THE SHELF?

WHY DID HE WANT FOOD?

WHY DO YOU EAT FOOD?

POPEYE WENT TO THE SHELF FOR FOOD. WHERE DO YOU GET YOUR FOOD?

Then say:

WE GET FOOD FROM THE GROCERY STORE, BUT WHERE DOES THE FOOD IN THE GROCERY STORE COME FROM?

Transparency 3-3

\*Not furnished in materials kit

ASK FOR  
OTHER IDEA

After the various general responses have been listed, project Transparency 3-3 with only the hamburger, bun, and condiments exposed. (The center of the transparency with stippled circle around it.)



## TEACHING STRATEGIES

### Preparation:

Have the overhead projector set up and ready to use.

Prepare yourself with the transparencies.

Students recall the Popeye Story (Activity 3-14)

POPEYE GO TO THE SHELF?

WHAT DOES HE WANT FOOD?

DO YOU EAT FOOD?

WHAT DO YOU GO TO THE SHELF FOR FOOD. WHERE DO YOU  
GET YOUR FOOD?

DO YOU GET YOUR FOOD FROM THE GROCERY STORE, BUT WHERE  
DOES YOUR FOOD IN THE GROCERY STORE COME FROM?

  
**ASK FOR  
OTHER IDEAS**

Various general responses have been listed,  
transparency 3-3 with only the hamburger, bun, and  
ketchup exposed. (The center of the transparency with  
the picture of the hamburger is around it.)

## ANTICIPATED STUDENT BEHAVIORS

Students:

--respond, "For food."

--respond, "For energy."

--recall the *Full and Healthy* game and respond,  
"For energy."

--respond, "Grocery store," "Shelves," "Drive-in,"  
"Restaurant."

--respond, "Plants," "Animals," "Gardens," "Farms,"  
"Ranches."

## MATERIALS

## TEACHING STRATEGIES

LET'S SEE WHERE ALL THE THINGS IN A HAMBURGER WITH "THE WORKS" COME FROM.

Expose the picture of the meat and ask:

WHERE DOES THE MEAT IN A HAMBURGER COME FROM?

After the correct response, expose the picture of the cow. Then say:

ANOTHER WAY TO SAY THAT MEAT IN A HAMBURGER COMES FROM A COW IS TO SAY THAT THE SOURCE OF THE MEAT IS A COW.

Write "source" on the chalkboard and have the class pronounce the word.

WHAT DID THE COW EAT TO MAKE THE MEAT THAT THE HAMBURGER CAME FROM?

ANOTHER WAY TO TALK ABOUT THE (grass) THAT THE COW EATS IS TO SAY THAT THE FOOD SOURCE FOR THE COW IS (grass).

When the plant sources are given, expose the picture of grass, hay, and corn. Then proceed to another ingredient of the total hamburger. Expose one step at a time in tracing each source. In developing the sources of the bun, proceed by asking:

WHO CAN TELL ME WHAT A HAMBURGER BUN IS MADE FROM?

## TEACHING STRATEGIES

SEE WHERE ALL THE THINGS IN A HAMBURGER  
"THE WORKS" COME FROM.

the picture of the meat and ask:

WHERE DOES THE MEAT IN A HAMBURGER COME FROM?

the correct response, expose the picture of the cow.

ANOTHER WAY TO SAY THAT MEAT IN A HAMBURGER  
COMES FROM A COW IS TO SAY THAT THE SOURCE  
OF THE MEAT IS A COW.

the word "source" on the chalkboard and have the class  
repeat the word.

WHAT DID THE COW EAT TO MAKE THE MEAT THAT  
IN THE HAMBURGER CAME FROM?

ANOTHER WAY TO TALK ABOUT THE (grass) THAT  
A COW EATS IS TO SAY THAT THE FOOD SOURCE  
OF THE COW IS (grass).

When plant sources are given, expose the picture of  
hay, and corn. Then proceed to another ingredient  
of a total hamburger. Expose one step at a time in  
each source. In developing the sources of the  
hamburger proceed by asking:

CAN YOU TELL ME WHAT A HAMBURGER BUN IS MADE FROM?

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-15

129

Students:

--suggest that the source is beef or a cow.

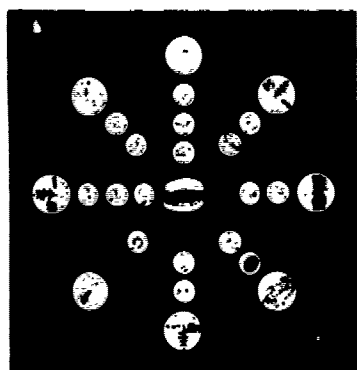
--indicate, "Food," "Hay," "Grass," "Corn."

--generally suggest ingredients, such as flour and  
milk.

# ACTIVITY 3-15

130

## MATERIALS



Transparency 3-4

## TEACHING STRATEGIES

List the correct replies on the chalkboard. Supply those that are missing so that the completed list includes: milk, sugar, yeast, and flour. Then proceed as before in exposing each step, one at a time. Reinforce the use of the word source.

If students bypass a step, for example from ketchup to tomato plant, accept the answer and ask:

WHAT PART OF THE TOMATO PLANT IS USED IN MAKING KETCHUP?

When all of the components have been completed ask:

AS WE TRACED EACH FOOD PART OF A HAMBURGER TO ITS SOURCE, DID YOU NOTICE ANYTHING THAT WAS THE SAME ABOUT THE SOURCES?

Project Transparency 3-4. Point to the seven plants and ask:

HERE ARE THE THINGS WE ENDED UP WITH WHEN WE TRACED THE HAMBURGER TO ITS SOURCES. HOW ARE THEY ALIKE?



## TEACHING STRATEGIES

direct replies on the chalkboard. Supply those missing so that the completed list includes: milk, eggs, and flour. Then proceed as before in the next step, one at a time. Reinforce the use of the word "source".

bypass a step, for example from ketchup to tomato, accept the answer and ask:

WHAT PART OF THE TOMATO PLANT IS USED IN MAKING KETCHUP?

After the components have been completed ask:

TRACED EACH FOOD PART OF A HAMBURGER TO ITS SOURCE, DID YOU NOTICE ANYTHING THAT WAS THE SAME ABOUT THE SOURCES?

Transparency 3-4. Point to the seven plants and

THE THINGS WE ENDED UP WITH WHEN WE TRACED THE HAMBURGER TO ITS SOURCES. HOW ARE THEY LIKE?

## ANTICIPATED STUDENT BEHAVIORS

Students:

--state, "The tomato."

--conclude that the eight components of a hamburger can all be traced to plants.

--reply, "All are plants," "All grow in the ground," "All need water."



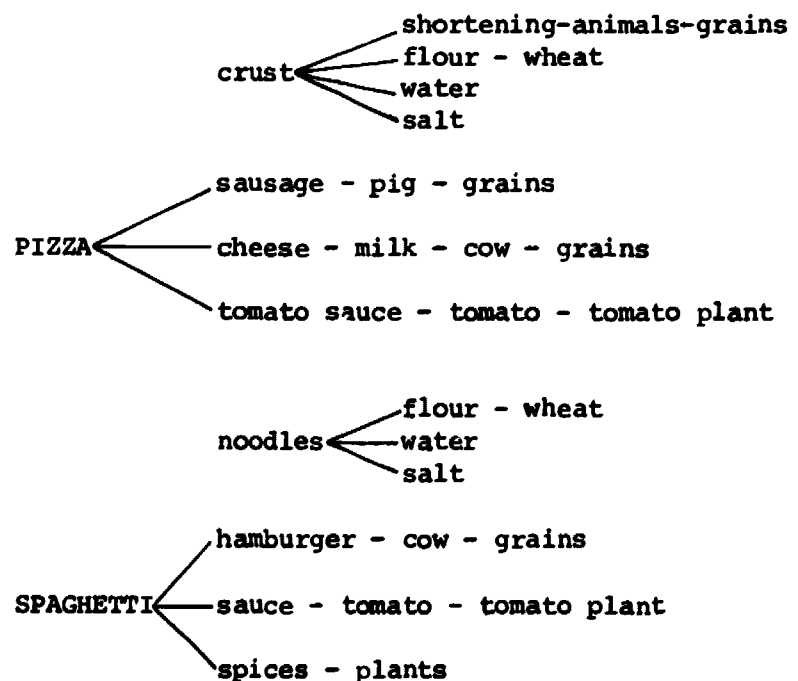
## MATERIALS

## TEACHING STRATEGIES

WE HAVE TRACED SOME OF THE FOOD WE EAT TO PLANTS. YOU WOULD FIND THAT NO MATTER WHAT FOOD WE EAT, WE COULD TRACE IT TO PLANTS. NOW LET'S TRY IT WITH SOME OTHER FOODS.

Call on a student to suggest a food. As a class, trace back the food to its sources as far as possible. Write the source sequence on the chalkboard as students state them.

Some examples of foods to trace are listed below.



## TEACHING STRATEGIES

WE TRACED SOME OF THE FOOD WE EAT TO PLANTS. WE WOULD FIND THAT NO MATTER WHAT FOOD WE EAT, WE WOULD TRACE IT TO PLANTS. NOW LET'S TRY IT WITH SOME OTHER FOODS.

Ask student to suggest a food. As a class, trace food to its sources as far as possible. Write sequence on the chalkboard as students state

Names of foods to trace are listed below.

crust — shortening — animals — grains  
— flour — wheat  
— water  
— salt

— sausage — pig — grains

— cheese — milk — cow — grains

— tomato sauce — tomato — tomato plant

noodles — flour — wheat  
— water  
— salt

— hamburger — cow — grains

— sauce — tomato — tomato plant

— spices — plants

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-15

(131)

Students:

--trace additional food sources.

ACTIVITY 3-15

(132)

MATERIALS

TEACHING STRATEGIES

CHOCOLATE  
CHIP  
COOKIES

- chocolate chips-cocoa bean-cocoa bean plant
- sugar - sugar beet - sugar beet plant
- flour - wheat
- butter - milk - cow - grains

ICE CREAM

- milk - cow - grains
- sugar - sugar beet - sugar beet plant
- vanilla - vanilla bean

PEANUT  
BUTTER  
SANDWICH

- bread
  - shortening - animals - grains
  - flour - wheat
  - milk - cow - grains
  - salt
- peanut butter-peanuts-peanut plant

INVOLVE YOUR  
SLOWEST  
STUDENTS



## TEACHING STRATEGIES

chocolate chips-cocoa bean-cocoa bean plant

sugar - sugar beet - sugar beet plant

flour - wheat

butter - milk - cow - grains

milk - cow - grains

sugar - sugar beet - sugar beet plant

vanilla - vanilla bean

INVOLVE YOUR  
SLOWEST  
STUDENTS

bread

- shortening - animals - grains
- flour - wheat
- milk - cow - grains
- salt

peanut butter-peanuts-peanut plant

## ANTICIPATED STUDENT BEHAVIORS

## MATERIALS

## TEACHING STRATEGIES

NOTE: Spices, water, and salt are considered to be nutrients but not food. Since they do not give us energy they are not considered foods. This may need to be explained to the students.

Conclude the activity by asking:

HOW IMPORTANT, THEN, DO YOU THINK PLANTS ARE FOR YOUR FOOD?

WHAT IS THE SOURCE OF ALL OF OUR FOOD?

Accept all answers which imply that without plants we could not have any foods.

GIVE SEVERAL  
STUDENTS A  
CHANCE TO RESPOND

## TEACHING STRATEGIES

es, water, and salt are considered to be  
rients but not food. Since they do not give  
energy they are not considered foods. This may  
d to be explained to the students.

ne activity by asking:

IMPORTANT, THEN, DO YOU THINK PLANTS ARE  
OUR FOOD?

IS THE SOURCE OF ALL OF OUR FOOD?

answers which imply that without plants we  
ave any foods.

## ANTICIPATED STUDENT BEHAVIORS


ACTIVITY 3-15

133

Students:

--describe in their own words that they are dependent  
upon plants for all of their food.

--describe in their own words that they are dependent  
upon plants for all of their food.

  
**GIVE SEVERAL  
STUDENTS A CHANCE  
TO RESPOND**

UNIT III, CORE C  
ACTIVITY 3-15: "My Source Of Food"

Activity name suggested by class:

Teacher

BSCS USE: Post Tally Rev  
Day 1 Day 2 Day 3 Day 4 Day 5 Day 6

1. Date taught (month and date, e.g. 11/2)						
2. Minutes of class time on science each day						
3. Minutes of preparation each day						
4. Students absent on each date (Use ID Number)						

5. Interest of class as expressed by apparent attention to what is happening.Number of students responding with: Name students you noted especially:  
(Number)

HIGH INTEREST	_____	_____	_____	_____	_____	_____
MODERATE INTEREST	_____	_____	_____	_____	_____	_____
INDIFFERENCE	_____	_____	_____	_____	_____	_____
MODERATE RESISTANCE	_____	_____	_____	_____	_____	_____
STRONG DISLIKE	_____	_____	_____	_____	_____	_____
HARD TO RATE	_____	_____	_____	_____	_____	_____

6. Equipment in kit: ☐ None ☐ Satisfactory ☐ Too fragile complicated to use ☐ Difficult to use
7. Equipment I got: ☐ None ☐ Easy to get but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:	Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:
10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:
11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:
12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?
13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:
14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:
15. Your rating of this activity:  
☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless  
--keep as is revision suggested major changes described --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

needed fragile complicated to use

Equipment I got: ☐ None ☐ Easy ☐ Hard to get, ☐ Hard to get, ☐ Unobtainable, needed to get but okay add to kit add to kit

8. Materials used:

	Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:

10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:

11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:

12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?

13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:

14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:

☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless  
 --keep as is revision suggested major changes described --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed.  
 What parts of this activity should be retained when the curriculum is revised?  
 Page(s) \_\_\_\_\_:

17. Did any students have difficulty tracing different foods to their sources?  
☐ No ☐ Yes: What did you do?

18. Were students confused about nutrients we need (water, salt, etc.) that are not foods?  
☐ No ☐ Yes: Comment.

19. Concern (or questions) about content:

20. Messages for staff (read immediately):

BSCS Evaluation: EMH Feedback Form 1c

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

SIDE A

UNIT III, CORE C  
ACTIVITY 3-15: "My Source Of Food"

Teacher \_\_\_\_\_

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.



## Me and my Environment

### OBJECTIVE FOCUS FOR THIS ACTIVITY

#### UNIT GOALS:

1. Realize and appreciate the energy inter-relationships between organisms.
2. Appreciate and understand man's dependence on green plants for food.

#### CORE C OBJECTIVES:

1. Realize that food is the only source of energy for man and all other animals.
6. Construct food chains and webs.

### MATERIALS

Slide 3-30 and Slide 3-31  
Deck of animal flash cards  
\*35mm Slide projector

\*Not furnished in materials kit

### TEACHING STRATEGIES

#### Activity 3-16. Who Eats Whom?

*This activity, besides emphasizing that animals eat other living things for food (energy), provides an opportunity for the students to become familiar with the eating habits of animals that are included in the food chains and webs developed in succeeding activities.*

Begin the activity by directing the students to think about the foods they normally eat. Do this by selecting a member of the class and asking:

WHAT ARE TWO FOODS THAT YOU AND YOUR FAMILY  
OFTEN EAT AT HOME?

WHAT ARE YOUR TWO FAVORITE FOODS?

**FOCUS FOR THIS ACTIVITY**

**GOALS:**

- Realize and appreciate the energy inter-relationships between organisms.
- Appreciate and understand man's dependence on green plants for food.

**OBJECTIVES:**

- Realize that food is the only source of energy for man and all other animals.
- Construct food chains and webs.

UNIT III. ENERGY RELATIONSHIPS  
IN MY ENVIRONMENT

CORE C. ENERGY FLOW THROUGH  
FOOD CHAINS AND WEBS

ACTIVITY 3-16. WHO EATS WHOM?



**TEACHING STRATEGIES**

3-16. Who Eats Whom?

Activity, besides emphasizing that animals eat other animals for food (energy), provides an opportunity for students to become familiar with the eating habits of animals that are included in the food chains developed in succeeding activities.

Activity by directing the students to think about the foods they normally eat. Do this by selecting a few foods from the class and asking:

NAME TWO FOODS THAT YOU AND YOUR FAMILY  
EAT AT HOME?

NAME YOUR TWO FAVORITE FOODS?

**ANTICIPATED STUDENT BEHAVIORS**

At the end of this activity, each student should:

- have identified animals on the flash cards.
- have identified what the animals eat.
- have classified each animal as plant eater, animal eater, or plant and animal eater.
- have successfully participated in the challenge game.

**Students:**

- name two foods commonly eaten for meals, such as milk, bread, potatoes, meat, hamburger, etc.
- name two favorite foods.



ACTIVITY 3-16

MATERIALS

TEACHING STRATEGIES

136

Slide 3-30



Slide 3-31



Ask the same questions of two or three other students. Suggest to the entire class that they list six foods they think are most often eaten by most people.

Project Slide 3-30 and ask:

WHAT IS THIS ANIMAL?

If students do not know it is a kangaroo, tell them and ask:

MOST OF US KNOW WHAT OUR PETS EAT, BUT CAN SOMEONE TELL ME WHAT A KANGAROO EATS?

THERE ARE A NUMBER OF ANIMALS THAT WE CAN'T OBSERVE AS EASILY AS WE CAN OUR PETS. SOMETIMES IT'S HARD TO KNOW WHAT THESE ANIMALS EAT.

Project Slide 3-31 and ask:

NOW WHAT DO YOU THINK THE KANGAROO EATS?

THE KANGAROO GRAZES ON PLANTS MUCH LIKE A COW DOES, ALTHOUGH IT SOMETIMES PICKS THE FOOD UP WITH ITS FRONT PAWS.

Hold up a deck of animal flash cards for the students to see and say:

ON THESE CARDS ARE PICTURED OTHER ANIMALS FROM DIFFERENT ENVIRONMENTS. LET'S NAME AS MANY OF THEM AS WE CAN.

## TEACHING STRATEGIES

Same questions of two or three other students.  
to the entire class that they list six foods they  
e most often eaten by most people.

Slide 3-30 and ask:

WHAT IS THIS ANIMAL?

Students do not know it is a kangaroo, tell them and

WHAT DO WE KNOW WHAT OUR PETS EAT, BUT CAN  
ANYONE TELL ME WHAT A KANGAROO EATS?

THESE ARE A NUMBER OF ANIMALS THAT WE CAN'T  
SERVE AS EASILY AS WE CAN OUR PETS. SOME-  
TIMES IT'S HARD TO KNOW WHAT THESE ANIMALS EAT.

Slide 3-31 and ask:

WHAT DO YOU THINK THE KANGAROO EATS?

A KANGAROO GRAZES ON PLANTS MUCH LIKE A  
GOAT DOES, ALTHOUGH IT SOMETIMES PICKS THE  
LEAVES UP WITH ITS FRONT PAWS.

A deck of animal flash cards for the students to  
use:

THESE CARDS ARE PICTURED OTHER ANIMALS FROM  
DIFFERENT ENVIRONMENTS. LET'S NAME AS MANY OF  
THEM AS WE CAN.

## ANTICIPATED STUDENT BEHAVIORS

Students:

--recognize and name animal as a kangaroo.

--will probably not be familiar with a kangaroo's  
eating habits.

--identify leaves of shrubs and grasses.

## MATERIALS



Fish



Mosquito



Spider



Pig



Hawk

## TEACHING STRATEGIES

INVOLVE YOUR  
SLOWEST  
& STUDENTS

One at a time hold the cards up so the students can see the animal pictured but not the name of it. Ask students to identify each animal. Call on all students so that each has the opportunity to identify at least one animal. If students are unfamiliar with a particular animal, or identify any incorrectly, uncover the name so that it may be read by the students.

After going through the deck, say:

NOW THAT WE HAVE NAMED THE ANIMALS, LET'S TRY TO NAME WHAT THESE ANIMALS NORMALLY EAT.

Again hold up the cards one at a time so the animal on the front is visible and ask the students to try to name the foods eaten by the animal.

The food(s) most commonly eaten by the animal are written on the back of each card. When the students have stated what food(s) they think the animal eats, tell them the food(s) listed on the back of the card. Remind them that the cards do not necessarily list everything an animal might eat, only the major items in the diet.

After two or three cards have been discussed, hold up the card picturing the hawk. When the students have had a chance to name the picture and the hawk's food, ask:

IS THERE ANYTHING THE SAME ABOUT THE FOODS A HAWK EATS? WHAT IS IT THESE HAVE IN COMMON?

## TEACHING STRATEGIES

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-16

137

Students:

INVOLVE YOUR  
SLOWEST  
STUDENTS

Time hold the cards up so the students can see  
pictured but not the name of it. Ask students  
y each animal. Call on all students so that  
he opportunity to identify at least one animal.  
s are unfamiliar with a particular animal, or  
ny incorrectly, uncover the name so that it may  
the students.

g through the deck, say:

HAT WE HAVE NAMED THE ANIMALS, LET'S TRY  
ME WHAT THESE ANIMALS NORMALLY EAT.

up the cards one at a time so the animal on  
is visible and ask the students to try to  
oods eaten by the animal.

) most commonly eaten by the animal are written  
k of each card. When the students have stated  
s) they think the animal eats, tell them the  
sted on the back of the card. Remind them that  
do not necessarily list everything an animal  
only the major items in the diet.

or three cards have been discussed, hold up the  
ring the hawk. When the students have had a  
name the picture and the hawk's food, ask:

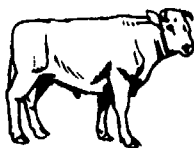
ERE ANYTHING THE SAME ABOUT THE FOODS A  
EATS? WHAT IS IT THESE HAVE IN COMMON?

--respond, "They all move," "They crawl." The  
students may recognize that all are animals.

ACTIVITY 3-16

138

MATERIALS



Steer



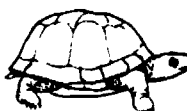
Mouse



Rabbit



Worm



Turtle

TEACHING STRATEGIES

If students do not perceive that the hawk eats only animals, say:

THE HAWK EATS ONLY ANIMALS. WE CALL THE HAWK AN ANIMAL EATER.

Hold up the card picturing the cow. When the students have identified the cow and listed the foods they think the cow eats, show them the foods pictured on the back of the card and ask:

IS THERE ANYTHING THE SAME ABOUT THE FOODS THE COW EATS?

IF WE CALL AN ANIMAL THAT EATS ONLY ANIMALS, LIKE A HAWK, AN ANIMAL EATER, WHAT DO YOU THINK WE CALL AN ANIMAL THAT EATS ONLY PLANTS, LIKE A COW?

Hold up the card of the mouse and have the students name the animal and the food it eats.

Ask:

IS THERE ANYTHING THE SAME ABOUT THE FOOD A MOUSE EATS?

WHILE MANY ANIMALS EAT ONLY OTHER ANIMALS, AND MANY ANIMALS EAT ONLY PLANTS, THERE ARE QUITE A FEW THAT EAT BOTH PLANTS AND ANIMALS. WHAT DO YOU THINK WE CAN CALL THEM?

## TEACHING STRATEGIES

nts do not perceive that the hawk ea's only  
say:

HAWK EATS ONLY ANIMALS. WE CALL THE  
K AN ANIMAL EATER.

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and ask:

HERE ANYTHING THE SAME ABOUT THE FOODS THE  
EATS?

WE CALL AN ANIMAL THAT EATS ONLY ANIMALS,  
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K WE CALL AN ANIMAL THAT EATS ONLY  
TS, LIKE A COW?

the card of the mouse and have the students name  
l and the food it eats.

HERE ANYTHING THE SAME ABOUT THE FOOD A  
E EATS?

E MANY ANIMALS EAT ONLY OTHER ANIMALS, AND  
ANIMALS EAT ONLY PLANTS, THERE ARE QUITE  
W THAT EAT BOTH PLANTS AND ANIMALS. WHAT  
OU THINK WE CAN CALL THEM?

## ANTICIPATED STUDENT BEHAVIORS

Students:

--identify all foods as plants or plant products.

--respond, "A plant eater."

--observe and state that mice eat both plant and  
animal material.

--respond, "Plant and animal eaters."

## MATERIALS



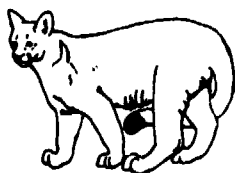
Deer



Frog



Man



Mountain lion

## TEACHING STRATEGIES

Continue presenting the animal cards, having the students name what the different animals eat. Now, in addition, after the pictured foods have been shown, ask the students to classify the animal as a plant eater, animal eater, or plant and animal eater.

When all the cards have been studied, prepare the students for a challenge game by asking:

WHO IN THE CLASS THINKS HE CAN REMEMBER MORE ABOUT WHAT THESE ANIMALS EAT THAN ANYONE ELSE?

Select one member of the class and say:

(Student's name) THINKS HE KNOWS MORE ABOUT THE FOODS EATEN BY THESE ANIMALS THAN THE REST OF YOU. WHO DISAGREES AND WOULD LIKE TO CHALLENGE HIM IN A CONTEST?

Then say:

LET'S HAVE A CONTEST.

Have the student who says he knows the most stand to one side of the front of the room. Instruct the challenger to stand on the other side. Both should be in a position to see the cards you hold.

Say:

I WILL FLASH ONE OF THE CARDS SHOWING THE PICTURES OF THE ANIMALS WE HAVE BEEN DISCUSSING. THE FIRST ONE TO NAME A FOOD THE ANIMAL EATS EARNS FIVE POINTS. I WILL DO THIS FOR TEN CARDS. THE ONE WHO EARNS THE MOST POINTS WINS.

## TEACHING STRATEGIES

presenting the animal cards, having the students  
the different animals eat. Now, in addition,  
the pictured foods have been shown, ask the students  
to identify the animal as a plant eater, animal eater,  
and animal eater.

After the cards have been studied, prepare the students  
for the challenge game by asking:

WHO IN THE CLASS THINKS HE CAN REMEMBER MORE  
ABOUT WHAT THESE ANIMALS EAT THAN ANYONE ELSE?

Choose a member of the class and say:

(Student's name) THINKS HE KNOWS MORE ABOUT  
THE FOODS EATEN BY THESE ANIMALS THAN THE  
REST OF YOU. WHO DISAGREES AND WOULD LIKE TO  
CHALLENGE HIM IN A CONTEST?

WHO WANTS TO HAVE A CONTEST.

Choose the student who says he knows the most stand to one  
side of the front of the room. Instruct the challenger  
to stand on the other side. Both should be in a position  
to show the cards you hold.

FOR EACH FLASH ONE OF THE CARDS SHOWING THE  
PICTURES OF THE ANIMALS WE HAVE BEEN DISCUSSING.  
THE FIRST ONE TO NAME A FOOD THE ANIMAL EATS EARNS  
ONE POINT. I WILL DO THIS FOR TEN CARDS. THE  
ONE WHO EARNES THE MOST POINTS WINS.

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-16

(139)

Students:

--raise their hands.

--raise hands indicating willingness to compete.

--come to the front of the room.



ACTIVITY 3-16

140

MATERIALS



Chicken



Bird



Insects

TEACHING STRATEGIES

One at a time flash ten cards from the deck. Have a student keep score at the chalkboard, scoring five points each round for the winner. If a student is first in naming a food, but the food named is incorrect, the opposing student has the opportunity to name the correct food.

Select two new students to challenge each other. Play the game in the same manner.

NOTE: Select contestants of equal ability or select cards which assure some success for all students. You may wish to have one student flash the cards, one student referee, and one student keep score on the chalkboard.

Possible variations of the game:

1. Winner remains at the front until defeated by a challenger.
2. Require two or more foods to be named for each animal.
3. Identify whether or not the animal is a plant eater, animal eater, or a plant and animal eater.

Continue to play for as long as interest warrants and/or until students have become familiar with the animals and what they eat.

When playing is completed, ask:

WHAT HAVE YOU LEARNED BY PLAYING THIS GAME?

## TEACHING STRATEGIES

Flash ten cards from the deck. Have a score at the chalkboard, scoring five points for the winner. If a student is first in a round, but the food named is incorrect, the student has the opportunity to name the correct food.

Allow students to challenge each other. Play the game in the same manner.

Select contestants of equal ability or select students which assure some success for all students. Students may wish to have one student flash the cards, one student referee, and one student keep score on the chalkboard.

Modifications of the game:

One student remains at the front until defeated by a challenger.

Require two or more foods to be named for each animal.

Discuss whether or not the animal is a plant eater, meat eater, or a plant and animal eater.

Play for as long as interest warrants and/or until students have become familiar with the animals and their diets.

When the game is completed, ask:

WHAT HAVE YOU LEARNED BY PLAYING THIS GAME?

## ANTICIPATED STUDENT BEHAVIORS

Students:

--call out names of foods as individual cards are displayed.

--respond, "About animals," "What animals eat."

### MATERIALS



**Grasses**



**Grain**

### TEACHING STRATEGIES

**WHY DO ANIMALS EAT?**

**Summarize the activity by saying:**

**WE NOW KNOW THE NAMES OF SEVERAL ANIMALS THAT  
LIVE IN THE ENVIRONMENT AND WE KNOW WHAT KINDS  
OF FOOD THEY USUALLY EAT FOR ENERGY.**

## TEACHING STRATEGIES

DO ANIMALS EAT?

the activity by saying:

HOW KNOW THE NAMES OF SEVERAL ANIMALS THAT  
IN THE ENVIRONMENT AND WE KNOW WHAT KINDS  
FOOD THEY USUALLY EAT FOR ENERGY.

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-16

(141)

Students:

--respond, "They need food," "For energy."

UNIT III, CORE C  
ACTIVITY 3-16: "Who Eats Whom"

Activity name suggested by class:	Teacher					
	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1. Date taught (month and date, e.g. 11/2)						
2. Minutes of class time on science each day						
3. Minutes of preparation each day						
4. Students absent on each date (Use ID Number)						

5. Interest of class as expressed by apparent attention to what is happening.Number of students responding with: Name students you noted especially:  
(Number)

HIGH INTEREST	_____
MODERATE INTEREST	_____
INDIFFERENCE	_____
MODERATE RESISTANCE	_____
STRONG DISLIKE	_____
HARD TO RATE	_____

6. Equipment in kit: ☐ None ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use
7. Equipment I got: ☐ None ☐ Easy to get but okay ☐ Hard to get, add to kit ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:
10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:
11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:
12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?
13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:
14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:
15. Your rating of this activity:  
☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless  
--keep as is revision suggested major changes described --drop it
- SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

1. Equipment I got: ☐ None ☐ Easy ☐ Hard to get, ☐ Hard to get, ☐ Unobtainable,  
needed to get but okay add to kit add to kit

2. Materials used:

	Worksheet #	Game #	Slides (show slide ncs.) #	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:
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13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:
14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:
15. Your rating of this activity:  
☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless  
--keep as is revision suggested major changes described --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed.  
What parts of this activity should be retained when the curriculum is revised?  
Page(s) \_\_\_\_\_:

17. Were any animals on the flashcards unknown by your students?  
☐ No ☐ Yes: Which?

18. Did students know what most of the animals on the flashcards ate?  
☐ Yes ☐ No: What animals did they have trouble with?

19. Concern (or questions) about content:

20. Messages for staff (read immediately):

BSCS Evaluation: EMH Feedback Form 1c

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

SIDE A

UNIT III, CORE C  
ACTIVITY 3-16: "Who Eats Whom"

Teacher \_\_\_\_\_

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.



## Me and my Environment

### OBJECTIVE FOCUS FOR THIS ACTIVITY

#### UNIT GOALS:

1. Realize and appreciate the energy inter-relationships between organisms.
2. Appreciate and understand man's dependence on green plants for food.

#### CORE C OBJECTIVES:

1. Realize that food is the only source of energy for man and all other animals.
2. Realize that food can be traced to a plant source.
3. Realize that all food chains begin with a green plant.
4. Appreciate that man and all other animals are directly or indirectly dependent upon plants for food.
5. Trace a food to its source.
6. Construct food chains and webs.
8. State the sources of food for various organisms.

### MATERIALS

### TEACHING STRATEGIES

#### Activity 3-17. The Food Chain Game

*This activity gives students the opportunity to build food chains and the teacher an opportunity to assess whether they understand the concept that all food for all animals comes from plants.*



**FOCUS FOR THIS ACTIVITY****GOALS:**

- 1. Realize and appreciate the energy inter-relationships between organisms.
- 2. Appreciate and understand man's dependence on green plants for food.

**OBJECTIVES:**

- 1. Realize that food is the only source of energy for man and all other animals.
- 2. Realize that food can be traced to a plant source.
- 3. Realize that all food chains begin with a green plant.
- 4. Appreciate that man and all other animals are directly or indirectly dependent upon plants for food.
- 5. Trace a food to its source.
- 6. Construct food chains and webs.
- 7. State the sources of food for various organisms.

**TEACHING STRATEGIES****17. The Food Chain Game**

Activity gives students the opportunity to build and the teacher an opportunity to assess if they understand the concept that all food for animals comes from plants.

**UNIT III.****ENERGY RELATIONSHIPS  
IN MY ENVIRONMENT****CORE C.****ENERGY FLOW THROUGH  
FOOD CHAINS AND WEBS****ACTIVITY 3-17. THE FOOD CHAIN GAME****BSCS****ANTICIPATED STUDENT BEHAVIORS**

At the end of this activity, each student should:

- have played the Food Chain Game.
- have felt successful and enjoyed the game.
- have defended a food chain sequence.
- have defined a food chain as a series of animals that eat other animals or plants for energy.

ACTIVITY 3-17

144

MATERIALS

- 1 Deck of animal flash cards
- 4 Decks of food chain cards

TEACHING STRATEGIES

Teacher Preparation:

1. Have available ample table space for the card game in Part II.

This activity, because of its length, is divided into Part I and Part II. The first part introduces the concept of food chains and that they end in a plant. The second part of the activity consists of a game which gives the students an opportunity to build food chains.

Part I.

Hold up the deck of flash cards and ask:

WHAT DID WE LEARN ABOUT ANIMALS IN OUR LAST ACTIVITY USING THESE CARDS?

Pick out the card depicting the hawk. Ask the students to identify it. Set the card on the left side of the chalk tray. Write the word "hawk" above the card and circle the word.

Ask:

WHO REMEMBERS WHAT THE HAWK EATS?

Hold up the card depicting a snake, set it down on the chalk tray to the right of the hawk, write "snake" on the chalkboard, circle the word and say:

HAWKS DO EAT SNAKES AND OTHER THINGS.

## TEACHING STRATEGIES

### Preparation:

available ample table space for the card game at II.

ty, because of its length, is divided into part II. The first part introduces the concepts and that they end in a plant. The second activity consists of a game which gives the opportunity to build food chains.

deck of flash cards and ask:

DO WE LEARN ABOUT ANIMALS IN OUR LAST  
Y USING THESE CARDS?

card depicting the hawk. Ask the students  
it. Set the card on the left side of the  
Write the word "hawk" above the card and  
ord.

REMEMBER WHAT THE HAWK EATS?

card depicting a snake, set it down on the  
to the right of the hawk, write "snake" on the  
circle the word and say:

DO EAT SNAKES AND OTHER THINGS.

## ANTICIPATED STUDENT BEHAVIORS

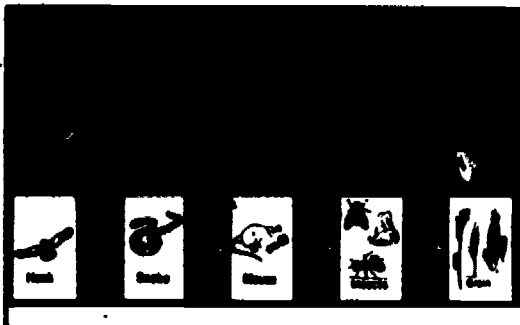
Students:

--recall, "What they eat," "That they eat," "Some  
eat plants," "Some eat animals."

--respond, "Rabbit," "Snake."

## MATERIALS

Diagram 3-9



## TEACHING STRATEGIES

Draw an arrow from the hawk to the snake. Say:

A HAWK EATS A SNAKE. WHAT DO SNAKES EAT?

Hold up a card depicting a mouse, set it down to the right of the snake, write "mouse" on the chalkboard above the card and circle the word. Say:

ONE OF THE THINGS YOU MENTIONED WAS A MOUSE.

Draw an arrow from the snake to the mouse and say:

A SNAKE MAY EAT A MOUSE. WHAT ABOUT THE MOUSE? WHAT DOES IT EAT?

Continue with the same strategy for what the mouse might eat (insect) and what the insect might eat (grain). Refer to Diagram 3-9 for an example. Point to the entire chain and say:

WE HAVE SEVERAL ANIMALS THAT ARE IMPORTANT TO ONE ANOTHER BECAUSE OF THEIR FOOD. SINCE EACH IS LINKED TO THE NEXT BECAUSE OF WHAT IT USUALLY EATS, WE CALL THIS A FOOD CHAIN.

Write "food chain" on the chalkboard.

If students seem confused about chains or links, use the following strategy. Ask:

WHAT OTHER KINDS OF CHAINS DO YOU KNOW ABOUT?

IS EACH PIECE OR LINK IMPORTANT IN A PAPER CHAIN?

## TEACHING STRATEGIES

row from the hawk to the snake. Say:

K EATS A SNAKE. WHAT DO SNAKES EAT?

card depicting a mouse, set it down to the  
the snake, write "mouse" on the chalkboard  
card and circle the word. Say:

F THE THINGS YOU MENTIONED WAS A MOUSE.

row from the snake to the mouse and say:

KE MAY EAT A MOUSE. WHAT ABOUT THE MOUSE?  
DOES IT EAT?

with the same strategy for what the mouse might  
eat) and what the insect might eat (grain).  
Diagram 3-9 for an example. Point to the  
link and say:

WE SEVERAL ANIMALS THAT ARE IMPORTANT TO  
ANOTHER BECAUSE OF THEIR FOOD. SINCE  
THIS IS LINKED TO THE NEXT BECAUSE OF WHAT  
IT USUALLY EATS, WE CALL THIS A FOOD CHAIN.

"chain" on the chalkboard.

If seem confused about chains or links, use  
the linking strategy. Ask:

OTHER KINDS OF CHAINS DO YOU KNOW ABOUT?

WHICH PIECE OR LINK IMPORTANT IN A PAPER CHAIN?

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-17

145

Students:

--respond, "Frog," "Worms," "Insects," "Mice."

--respond, "Grain," "Insects."

--recall other types of chains, such as paper  
chains at Christmas and chains for locking up  
bicycles.

--visualize a paper chain and respond, "Yes."

ACTIVITY 3-17

146

**MATERIALS**

**TEACHING STRATEGIES**

Follow the strategy outlined above for the mountain lion, deer, and grass chain; the man, steer, and grass chain; and the sheep and grass chain. After writing the word on the chalkboard, select students to draw circles and arrows to show each link in the chain.

Say:

THERE ARE MANY EXAMPLES OF CHAINS WE CAN DISCUSS BESIDES THESE. ARE ALL OF THE FOOD CHAINS THE SAME LENGTH?

ARE LIVING THINGS IMPORTANT FOR FOOD FOR ALL ANIMALS?

LOOK CAREFULLY AT EACH OF THESE FOOD CHAINS. CAN YOU FIND ONE IMPORTANT THING THAT IS ALIKE IN ALL OF THE CHAINS?

If students fail to perceive that each chain ends with a plant, say:

LOOK AT THE END OF EACH CHAIN ON THIS SIDE OF THE CHALKBOARD (point to the right side). WHAT IS THE SAME ABOUT EACH OF THESE LIVING THINGS?

Ask:

IF WE WERE TO BUILD OTHER CHAINS LIKE THESE, WHAT KIND OF LIVING THING WOULD WE EXPECT TO END WITH?

## TEACHING STRATEGIES

strategy outlined above for the mountain lion, grass chain; the man, steer, and grass chain; sheep and grass chain. After writing the word on board, select students to draw circles and arrows in link in the chain.

ARE MANY EXAMPLES OF CHAINS WE CAN DISCUSS THESE. ARE ALL OF THE FOOD CHAINS THE SAME LENGTH?

WHAT ARE THE MOST IMPORTANT THINGS FOR FOOD FOR ALL?

LOOK CAREFULLY AT EACH OF THESE FOOD CHAINS. DO YOU FIND ONE IMPORTANT THING THAT IS COMMON TO ALL OF THE CHAINS?

DO YOU FAIL TO PERCEIVE THAT EACH CHAIN ENDS WITH A PLANT?

POINT TO THE END OF EACH CHAIN ON THIS SIDE OF THE CHALKBOARD (point to the right side). IS THERE THE SAME ABOUT EACH OF THESE LIVING THINGS?

IF WE WERE TO BUILD OTHER CHAINS LIKE THESE, WHAT KIND OF LIVING THING WOULD WE EXPECT TO FIND WITH?

## ANTICIPATED STUDENT BEHAVIORS

Students:

--observe and respond, "No."

--respond, "Yes."

--respond, "All begin with an animal," "Linked together," "I don't know," "All ends in a plant."

--respond, "All end in plants."

--recall, "Plants."

## MATERIALS

## TEACHING STRATEGIES

Have students recall the activity where they traced ingredients of a hamburger to their sources. Say:

DO YOU REMEMBER WHAT WE ENDED WITH WHEN WE TRACED THE HAMBURGER AND BUN TO THEIR FOOD SOURCES?

NOW LOOK AT OUR FOOD CHAINS.

WHAT DO WE END UP WITH IN EVERY FOOD CHAIN?

WHAT DO WE END UP WITH IN FOOD SOURCES AND FOOD CHAINS?

Make sure this concept is clear before proceeding.

### Part II.

WE'VE BUILT ONLY A FEW FOOD CHAINS. WE CAN BUILD SOME MORE BY PLAYING THE *FOOD CHAIN GAME*.

Prepare the students to play by dividing the class into groups of three or four. Distribute a deck of food chain cards to each group. Allow time for them to examine the cards. Point out that this deck differs from the flash cards in that it includes some cards with only plants pictured.

Say:

THE OBJECT OF THIS GAME IS TO BUILD FOOD CHAINS. YOU WILL DO THIS BY USING THE LIVING THINGS PICTURED ON THE CARDS. THIS GAME IS SIMILAR TO THE RUMMY GAME YOU HAVE PLAYED BEFORE. I'LL EXPLAIN THE RULES AND THEN PLAY THE GAME WITH TWO OF YOU SO WE CAN SEE HOW IT IS PLAYED.



## TEACHING STRATEGIES

Students recall the activity where they traced  
the path of a hamburger to their sources. Say:

DO YOU REMEMBER WHAT WE ENDED WITH WHEN WE  
TRACED THE HAMBURGER AND BUN TO THEIR FOOD  
SOURCES?

LOOK AT OUR FOOD CHAINS.

DO WE END UP WITH IN EVERY FOOD CHAIN?

DO WE END UP WITH IN FOOD SOURCES AND  
CHAINS?

Make this concept is clear before proceeding.

WE BUILT ONLY A FEW FOOD CHAINS. WE CAN  
BUILD SOME MORE BY PLAYING THE *FOOD CHAIN* GAME.

Have the students to play by dividing the class into  
three or four. Distribute a deck of food chain  
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cards. Point out that this deck differs from the flash  
cards that it includes some cards with only plants

THE OBJECT OF THIS GAME IS TO BUILD FOOD CHAINS.  
WE WILL DO THIS BY USING THE LIVING THINGS  
LISTED ON THE CARDS. THIS GAME IS SIMILAR  
TO THE RUMMY GAME YOU HAVE PLAYED BEFORE. I'LL  
EXPLAIN THE RULES AND THEN PLAY THE GAME WITH  
YOU SO WE CAN SEE HOW IT IS PLAYED.

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-17

147

Students:

--recall hamburger transparency and say, "Plants."

--conclude, "Plants."

--conclude, "Plants."

ACTIVITY 3-17

MATERIALS

TEACHING STRATEGIES

148

The rules of the game are:

1. Decide who will be the first dealer. The player to the left of the dealer plays first.
2. After the cards are shuffled, each player will be dealt four cards.
3. The rest of the cards are placed face down in a pile in the middle of the table. The top card on that pile is turned face up beside the others.
4. Each player looks at the cards in his hand to see if any of his cards form a food chain. One rule to remember is that chains must be complete-- they must begin with an animal and end with a plant.
5. If the player has one or more food chains in his hand, he may now lay the cards face up on the table in the correct order, declaring who eats whom as he does so. Lay the cards down so that they form a chain.
6. The player then picks from the face down pile the number of cards he just put down. After restoring his hand to the five cards he began with, he discards one and is back to his original hand of four. Each player has four cards at the beginning of his turn, draws one so that during his turn he has five cards, and discards at the end of this turn (back to four cards).

## TEACHING STRATEGIES

the game are:

who will be the first dealer. The player left of the dealer plays first.

the cards are shuffled, each player will get four cards.

est of the cards are placed face down in a pile in the middle of the table. The top card of that pile is turned face up beside the others.

player looks at the cards in his hand to see if any of his cards form a food chain. One rule to remember is that chains must be complete--they must begin with an animal and end with a plant.

player has one or more food chains in his hand, he may now lay the cards face up on the table in the correct order, declaring who eats whom as he does so. Lay the cards down so that they form a chain.

player then picks from the face down pile the same number of cards he just put down. After restoring his hand to the five cards he began with, he discards one card and is back to his original hand of four. Each player has four cards at the beginning of his turn, and one so that during his turn he has five cards, and discards at the end of this turn (back to four).

## ANTICIPATED STUDENT BEHAVIORS

## MATERIALS

## TEACHING STRATEGIES

7. Each player takes a turn. Cards drawn are used to form new chains or to add to other chains he has made. For example, a student may lay down cards for a mouse, insect, and grain as a chain. During a later turn, a snake card could be added to the beginning of his chain.
8. Each card in a chain is worth one point. The first person to lay down enough chains so that they have at least ten points is the winner. All food chains must be complete and end with a plant.
9. If any questions arise about what eats what, make it clear that for purposes of the game the eating habits as described on the cards will be the only ones accepted.

Now select two or three students and go over the rules again, demonstrating how the game is played. Continue the demonstration only until the game is understood. Then allow the students to play the game as long as it seems appropriate.

At the end of the game time, ask how many students won the game at least once. Use the chart in Item 18 of the Feedback Sheet for this activity to list their names. Ask how many won the game twice, three times, and more than three times. Check off their names on the chart as they raise their hands.

## TEACHING STRATEGIES

player takes a turn. Cards drawn are used to form new chains or to add to other chains he has. For example, a student may lay down cards for house, insect, and grain as a chain. During a later turn, a snake card could be added to the beginning of his chain.

A card in a chain is worth one point. The first person to lay down enough chains so that they have at least ten points is the winner. All food chains must be complete and end with a plant.

Any questions arise about what eats what, make clear that for purposes of the game the eating relationships as described on the cards will be the only ones accepted.

Two or three students and go over the rules demonstrating how the game is played. Continue instruction only until the game is understood. Let the students to play the game as long as it is appropriate.

At the end of the game time, ask how many students won at least once. Use the chart in Item 18 of the sheet for this activity to list their names. Ask how many won the game twice, three times, and more times. Check off their names on the chart as they win.

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-17

149

Students:

--observe two or three classmates and the teacher playing the game.

ACTIVITY 3-17

150

**MATERIALS**

**TEACHING STRATEGIES**

Use this information to regroup your students to play the game the next time. Group the winners together to make the game more challenging for them and allow others an opportunity to win. Give assistance to any that are having difficulty, or assign some of the winners to help them next time.

Conclude by saying:

FROM PLAYING THIS GAME, WHAT HAVE WE LEARNED  
ABOUT WHY ANIMALS ARE IMPORTANT TO EACH OTHER?

Student responses should indicate interdependency of living things in terms of food.

## TEACHING STRATEGIES

information to regroup your students to play the next time. Group the winners together to game more challenging for them and allow others unity to win. Give assistance to any that are difficulty, or assign some of the winners to help time.

by saying:

PLAYING THIS GAME, WHAT HAVE WE LEARNED  
WHY ANIMALS ARE IMPORTANT TO EACH OTHER?

Responses should indicate interdependency of  
ings in terms of food.

## ANTICIPATED STUDENT BEHAVIORS

Students:

--demonstrate ability to play the game following the rules described.

--conclude, "Because they eat each other," "They wouldn't have any food without each other,"  
"They'd die," "They wouldn't have any energy."

UNIT III, CORE C  
ACTIVITY 3-17: "Food Chain Game"

Activity name suggested by class: \_\_\_\_\_

	Teacher					
	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
1. Date taught (month and date, e.g. 11/2)						
2. Minutes of class time on science each day						
3. Minutes of preparation each day						
4. Students absent on each date (Use ID Number)						

BSCS USE: Post \_\_\_\_\_ Tally \_\_\_\_\_ Rev \_\_\_\_\_

1. Date taught (month and date, e.g. 11/2)

2. Minutes of class time on science each day

3. Minutes of preparation each day

4. Students absent on each date (Use ID Number)

5. Interest of class as expressed by apparent attention to what is happening.

Number of students responding with: \_\_\_\_\_ Name students you noted especially: \_\_\_\_\_

	(Number)
HIGH INTEREST	_____
MODERATE INTEREST	_____
INDIFFERENCE	_____
MODERATE RESISTANCE	_____
STRONG DISLIKE	_____
HARD TO RATE	_____

6. Equipment in kit: ☐ None ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use
7. Equipment I got: ☐ None ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:
10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:
11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:
12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?
13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:
14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:

☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless  
--keep as is ☐ revision suggested ☐ major changes described ☐ --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:



7. Equipment I got: ☐ None ☐ Easy ☐ Hard to get, ☐ Hard to get, ☐ Unobtainable, ☐ Difficult  
needed to get but okay add to kit add to kit

8. Materials used:

Worksheet #	#	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:
10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:
11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:
12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?
13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:
14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:  
☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless  
--keep as is revision suggested major changes described --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed.  
What parts of this activity should be retained when the curriculum is revised?  
Page(s) \_\_\_\_\_:

17. Was any student unsuccessful in playing the food chain game?  
☐ No ☐ Yes: Who and why?

18. List the students who won the food chain game on the chart below:
- Students

One win:
Two wins:
Three or more wins:

19. Concern (or questions) about content:

20. Messages for staff (read immediately):

BSCS Evaluation: EMH Feedback Form 1c

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

SIDE A

UNIT III, CORE C  
ACTIVITY 3-17: "Food Chain Game"

Teacher \_\_\_\_\_

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.



## Me and my Environment

### OBJECTIVE FOCUS FOR THIS ACTIVITY

#### UNIT GOALS:

1. Realize and appreciate the energy inter-relationships between organisms.
2. Appreciate and understand man's dependence on green plants for food.

#### CORE C OBJECTIVES:

4. Appreciate that man and all other animals are directly or indirectly dependent upon plants for food.
5. Trace a food to its source.
6. Construct food chains and webs.
7. Know that energy flows from one kind of organism to another kind of organism in a food chain.
8. State the sources of food for various organisms.
9. Appreciate the interrelationships of organisms in a food web.
10. Understand the consequences that the removal of an organism has on a food web.

### MATERIALS

### TEACHING STRATEGIES

#### Activity 3-18. Construction Of A Food Web

*By now students should be familiar with the idea of linear interlinking events in a food chain. In this activity, the interconnecting aspects of one chain to another are developed through the construction of food webs.*

**FOCUS FOR THIS ACTIVITY**

**GOALS:**

- Realize and appreciate the energy interrelationships between organisms.
- Appreciate and understand man's dependence on green plants for food.

**OBJECTIVES:**

- Appreciate that man and all other animals are directly or indirectly dependent upon plants for food.
- Trace a food to its source.
- Construct food chains and webs.
- Know that energy flows from one kind of organism to another kind of organism in a food chain.
- State the sources of food for various organisms.
- Appreciate the interrelationships of organisms in a food web.
- Understand the consequences that the removal of an organism has on a food web.

**UNIT III.**

**ENERGY RELATIONSHIPS  
IN MY ENVIRONMENT**

**CORE C.**

**ENERGY FLOW THROUGH  
FOOD CHAINS AND WEBS**

**ACTIVITY 3-18. CONSTRUCTION OF A FOOD WEB**



**BSCS**

**TEACHING STRATEGIES**

**3-18. Construction Of A Food Web**

Students should be familiar with the idea of interlinking events in a food chain. In this activity, the interconnecting aspects of one chain to another will be developed through the construction of food

**ANTICIPATED STUDENT BEHAVIORS**

*At the end of this activity, each student should:*

- have participated in pinning and marking food chains on Worksheets 3-17 and 3-18.
- have predicted that a particular animal can be one link in many different chains.

# ACTIVITY 3-18

152

## MATERIALS

- 1 Deck of animal flash cards
- Worksheet 3-17
- Worksheet 3-18
- \*4 Pieces of heavy cardboard at least 8 1/2" X 11" for each pair of students
- \*Colored chalk
- 20 Map push pins for each pair of students
- \*Colored rubber bands, about 25 per pair of students
- Slides 3-32 through 3-34
- \*35mm Slide projector

\*Not furnished in materials kit

## TEACHING STRATEGIES

### Teacher Preparation:

1. Collect pieces of heavy cardboard and cut them down to 8 1/2 X 11 inches before class. Two thicknesses of cardboard should be used so that pins will stay in position and not stick through. If cardboard is not available, corkboard or anything else can be used that tacks will go into.
2. Long rubber bands (3 to 4 inches) should be used since they can more easily be stretched. Be sure they are colored.

NOTE: Place the bean plants to be tested during Activity 3-20 in the dark (light-proof container or cupboard) three days prior to beginning that activity.

Begin by saying:

WHAT WAS THE NAME OF THE GAME WE PLAYED (yesterday).

WHAT DID EACH OF YOU TRY TO DO TO WIN THE GAME?

WERE ANY OF THE ANIMALS IN MORE THAN ONE CHAIN?

## TEACHING STRATEGIES

### ration:

pieces of heavy cardboard and cut them down 2 X 11 inches before class. Two thicknesses of cardboard should be used so that pins will stay in place and not stick through. If cardboard is not available, corkboard or anything else can be used that tacks will go into.

Rubber bands (3 to 4 inches) should be used because they can more easily be stretched. Be sure they are colored.

Get the bean plants to be tested during activity 3-20 in the dark (light-proof container or cardboard) three days prior to beginning that activity.

ng:

THE NAME OF THE GAME WE PLAYED (yesterday).

WHAT EACH OF YOU TRY TO DO TO WIN THE GAME?

WHAT ABOUT THE ANIMALS IN MORE THAN ONE CHAIN?

## ANTICIPATED STUDENT BEHAVIORS

*At the end of this activity, each student should:*

- have recalled that a food chain is a series of animals that eat other animals or plants for energy.
- have defined a food web as many interconnected food chains.
- have demonstrated an understanding of the interdependence of living things in a food web by correctly reporting about Worksheet 3-17 or 3-18.

Students:

- recall, "Food chain game."
- recall, "Make chains," "Make those food things," "Connect foods."
- respond, "Yes," "No," "I don't remember."

## MATERIALS

## TEACHING STRATEGIES

Place the flash cards of the hawk, snake, mouse, and grain on the chalk tray in sequence. Draw arrows to show a food chain.

Ask:

HOW MANY PLANTS OR ANIMALS IS THE HAWK  
CONNECTED WITH?

INVOLVE  
SLOWES  
& STUDEN

HOW MANY PLANTS OR ANIMALS IS THE SNAKE  
CONNECTED WITH?

HOW MANY PLANTS OR ANIMALS IS THE MOUSE  
CONNECTED WITH?

HOW MANY PLANTS OR ANIMALS IS THE GRAIN  
CONNECTED WITH?

DOES A HAWK EVER EAT ANYTHING BESIDES  
SNAKES? WHAT?

DOES A SNAKE EVER EAT ANYTHING BESIDES  
MICE? WHAT?

DOES A MOUSE EAT ANYTHING BESIDES GRAIN?  
WHAT?

## TEACHING STRATEGIES

flash cards of the hawk, snake, mouse, and grain  
al tray in sequence. Draw arrows to show a food

ANY PLANTS OR ANIMALS IS THE HAWK  
CTED WITH?

ANY PLANTS OR ANIMALS IS THE SNAKE  
CTED WITH?

ANY PLANTS OR ANIMALS IS THE MOUSE  
CTED WITH?

ANY PLANTS OR ANIMALS IS THE GRAIN  
CTED WITH?

A HAWK EVER EAT ANYTHING BESIDES  
S? WHAT?

A SNAKE EVER EAT ANYTHING BESIDES  
WHAT?

A MOUSE EAT ANYTHING BESIDES GRAIN?

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-18

153

Students:

--respond, "One."

INVOLVE YOUR  
SLOWEST  
STUDENTS

--respond, "Two."

--respond, "Two."

--respond, "One."

--recall *Food Chain Game* and respond, "Yes,"  
giving examples.

--recall *Food Chain Game* and respond, "Yes,"  
giving examples.

--recall *Food Chain Game* and respond, "Yes,"  
giving examples.

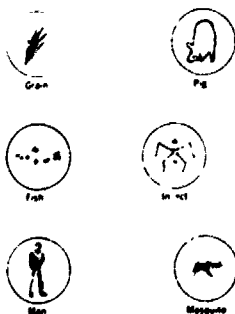


# ACTIVITY 3-18

154

## MATERIALS

Slide 3-32



## TEACHING STRATEGIES

DO YOU THINK A PLANT OR ANIMAL COULD BE PART OF MORE THAN ONE FOOD CHAIN?

Project Slide 3-32 and say:

LET'S SEE IF WE CAN FIND OUT IF YOUR PREDICTIONS ARE CORRECT.

WHAT ANIMALS AND PLANTS DO YOU SEE PICTURED?

You may wish to point to each as it is named.

GIVE SEVERAL  
STUDENTS A  
TO RESPOND

Say:

LET'S START WITH AN ANIMAL AND SEE WHICH OF THE OTHER THINGS PICTURED HERE THE ANIMAL EATS. WITH WHICH ANIMAL DO YOU WANT TO START?

Let students decide on an animal.

Call on a student and ask:

WHICH OF THE THINGS PICTURED HERE DID YOU LEARN THAT A (pig) EATS?

Draw a line on the chalkboard image from the center of the animal to the food that it eats. Use a different color for each animal.

## TEACHING STRATEGIES

THINK A PLANT OR ANIMAL COULD BE PART  
E THAN ONE FOOD CHAIN?

de 3-32 and say:

SEE IF WE CAN FIND OUT IF YOUR  
TIONS ARE CORRECT.

ANIMALS AND PLANTS DO YOU SEE PICTURED?

sh to point to each as it is named.

START WITH AN ANIMAL AND SEE WHICH OF  
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WITH WHICH ANIMAL DO YOU WANT TO START?

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tudent and ask:

OF THE THINGS PICTURED HERE DID YOU  
THAT A pig EATS?

e on the chalkboard image from the center of  
to the food that it eats. Use a different  
each animal.

## ANTICIPATED STUDENT BEHAVIORS

Students:

--make predictions.

--name the organisms pictured.

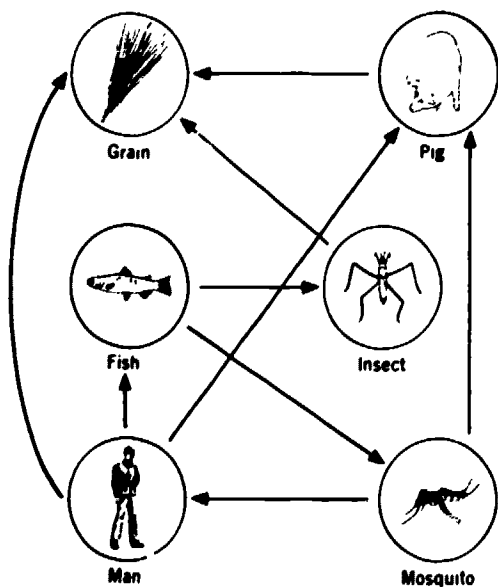
  
**GIVE SEVERAL  
STUDENTS A CHANCE  
TO RESPOND**

--select an animal.

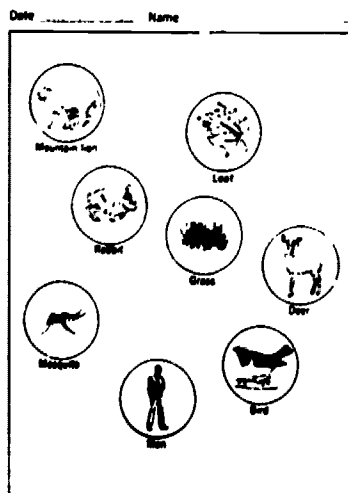
--name a food normally eaten by the animal selected.

## MATERIALS

Diagram 3-10



Slide 3-33



## TEACHING STRATEGIES

Ask:

IS THERE ANYTHING ELSE THIS ANIMAL EATS?

Draw a second line from the center of (pig) to another food that (pigs) eat. Continue in the same manner until lines have been drawn from the animal chosen to all the foods it eats. Begin with another animal and follow the same procedure. Continue until your connections are complete as illustrated in Diagram 3-10.

Divide the class into teams of two. If you anticipate that a particular student might have problems, pair him with a more capable student.



Project Slide 3-33 and have students identify each picture.

Select students to distribute pieces of cardboard, Worksheets 3-17 and 3-18, rubber bands, and pins to each team. Tell them not to do anything with the materials until directed to do so. Demonstrate what the students are to do while giving the directions below. Refer to Diagram 3-11 as necessary.



## TEACHING STRATEGIES

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-18

155

Students:

--name other foods eaten.

RE ANYTHING ELSE THIS ANIMAL EATS?

nd line from the center of (pig) to another  
(pigs) eat. Continue in the same manner until  
been drawn from the animal chosen to all the  
ts. Begin with another animal and follow the  
ure. Continue until your connections are  
illustrated in Diagram 3-10.

class into teams of two. If you anticipate that  
r student might have problems, pair him with a  
e student.



DISTRIBUTE MATERIALS

de 3-33 and have students identify each

ents to distribute pieces of cardboard,  
3-17 and 3-18, rubber bands, and pins to  
Tell them not to do anything with the  
ntil directed to do so. Demonstrate what  
s are to do while giving the directions below.  
agram 3-11 as necessary.

DEMONSTRATE

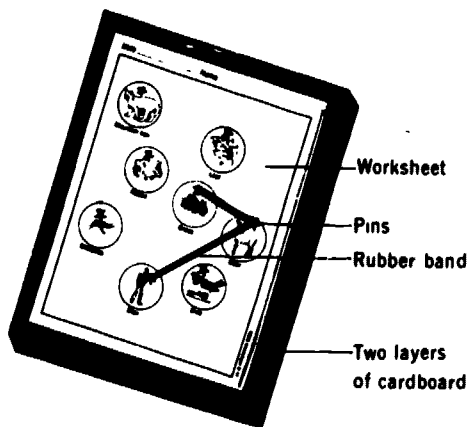


## ACTIVITY 3-18

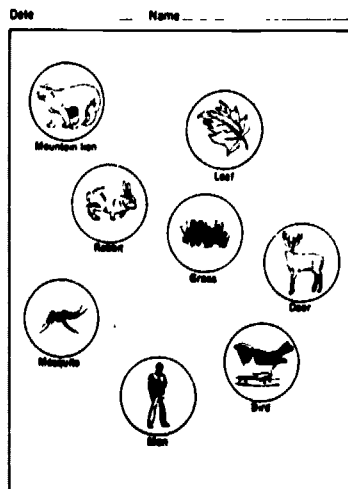
156

### MATERIALS

Diagram 3-11



Slide 3-33



### TEACHING STRATEGIES

1. Lay Worksheet 3-17 on top of two sheets of cardboard.
2. Stick a push pin into the center of each picture so the worksheet and the cardboard are stuck together.
3. Pick one animal to start with. Put one end of a rubber band around the pin stuck in that animal picture.
4. Loop the other end of the rubber band around the pin stuck in the center of what that animal eats (e.g., from mountain lion to deer). Have the students do this. Check to see that each team has done it correctly.
5. Instruct the students to do the same thing with all of the animals on their sheets. If necessary, demonstrate one more example on your sheet. Tell them to talk about what an animal eats with their partners and then take turns putting on the rubber bands.

When students have completed Worksheet 3-17, again project Slide 3-33. Call on various teams to tell how and why they completed the worksheets as they did. Refer to Diagram 3-12 for the correct answers.

Then ask the following questions to focus on the significance of the rubber bands.

WHAT ARE WE IMAGINING THE RUBBER BANDS SHOW IN EACH OF OUR FOOD CHAINS?

## TEACHING STRATEGIES

Worksheet 3-17 on top of two sheets of cardboard.

Stick a push pin into the center of each picture on the worksheet and the cardboard are stuck together.

Choose one animal to start with. Put one end of a rubber band around the pin stuck in that animal's picture.

Stretch the other end of the rubber band around the pin stuck in the center of what that animal eats (e.g., a mountain lion to deer). Have the students do this. Check to see that each team has done it correctly.

Instruct the students to do the same thing with all the animals on their sheets. If necessary, demonstrate one more example on your sheet. Tell them to talk about what an animal eats with their partners and then take turns putting on the rubber bands.

After the students have completed Worksheet 3-17, again project the worksheet. Call on various teams to tell how and why they stretched the worksheets as they did. Refer to the worksheet for the correct answers.

Ask the following questions to focus on the meaning of the rubber bands.

DO THE RUBBER BANDS SHOW  
US OUR FOOD CHAINS?

## ANTICIPATED STUDENT BEHAVIORS

Students:

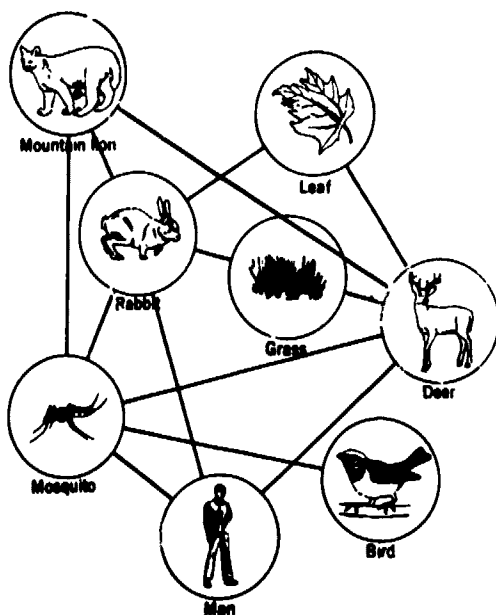
--construct food webs by connecting animals with rubber bands.

--respond by volunteering their answers.

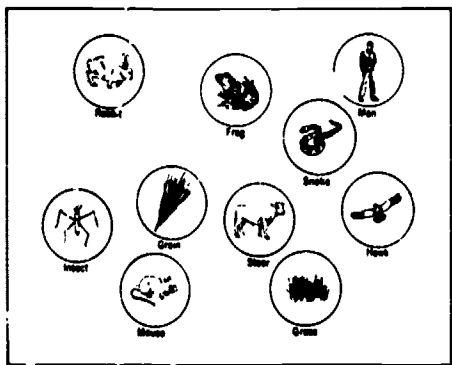
--recall that they stand for, "The links from one thing to another."

## MATERIALS

Diagram 3-12



Slide 3-34



## TEACHING STRATEGIES

Direct attention to a specific link, such as that between the hawk and mouse, and ask:

WHY DID THE (hawk) EAT THE (mouse)?

WHAT DO ANIMALS GET OUT OF FOOD?

TO HOW MANY DIFFERENT ANIMALS COULD THE ENERGY FROM THE (mouse) GO?

WHAT DO THE RUBBER BANDS IN OUR CHAINS SHOW?

Now project Slide 3-34 and have students identify each picture.

Direct students to complete Worksheet 3-18, constructing food chains as before. When students have completed Worksheet 3-18, again project Slide 3-34. Call on various teams to tell how and why they completed the worksheet as they did. Refer to Diagram 3-13 for the correct answers.

Then focus their attention on the significance of the rubber bands as before. Select a specific link, such as the frog and insect, and ask:

WHY DID THE (frog) EAT THE (insect)?

WHAT DO ANIMALS GET OUT OF FOOD?

IN HOW MANY DIFFERENT CHAINS COULD THE ENERGY FROM THE (insect) GO?

## TEACHING STRATEGIES

tion to a specific link, such as that between  
mouse, and ask:

THE (hawk) EAT THE (mouse)?

ANIMALS GET OUT OF FOOD?

MANY DIFFERENT ANIMALS COULD THE  
FROM THE (mouse) GO?

THE RUBBER BANDS IN OUR CHAINS SHOW?

Slide 3-34 and have students identify each

ents to complete Worksheet 3-18, constructing  
as before. When students have completed  
-18, again project Slide 3-34. Call on v. ous  
ll how and why they completed the worksheet as  
Refer to Diagram 3-13 for the correct answers.

their attention on the significance of the  
s as before. Select a specific link, such  
and insect, and ask:

THE (frog) EAT THE (insect)?

ANIMALS GET OUT OF FOOD?

MANY DIFFERENT CHAINS COULD THE ENERGY  
E (insect) GO?

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-18

(157)

Students:

--respond, "For food."

--recall, "Energy."

--study the connecting chains to determine the  
number of chains that the (mouse) could be in.

--infer that the rubber bands represent the  
pathway of energy and that energy is flowing  
from organism to organism.

--respond by volunteering their answers.

--respond, "For food."

--recall, "Energy."

--study the connecting chains to determine the  
number of chains that the (insect) could be in.

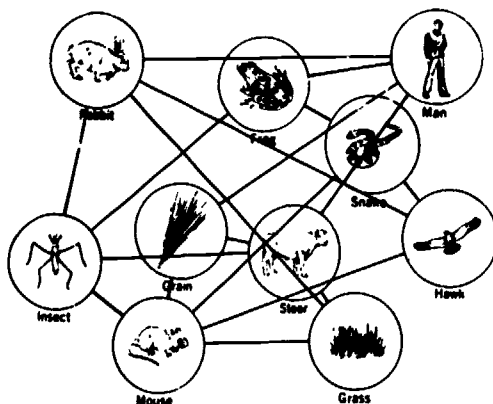


# ACTIVITY 3-18

158

## MATERIALS

Diagram 3-13



## TEACHING STRATEGIES

WHAT DO THE RUBBER BANDS IN OUR CHAINS SHOW?

Hold up one of the student boards with completed chains and ask:

WHAT DOES THE BOARD WITH THE CONNECTED FOOD CHAINS LOOK LIKE?

ACCEPT ALL ANSWERS

If students do not suggest calling it a food web, tell them:

FOOD CHAINS WHICH ARE CONNECTED ARE CALLED A FOOD WEB. WHY DO YOU THINK FOOD CHAINS ARE CALLED A FOOD WEB?

Write "food web" on the chalkboard.

HOW IS A FOOD WEB DIFFERENT FROM A FOOD CHAIN?

Emphasize to students that in a web each living thing might have several paths of food energy, whereas in a chain there is only one path.

## TEACHING STRATEGIES

THE RUBBER BANDS IN OUR CHAINS SHOW?

of the student boards with completed chains

ES THE BOARD WITH THE CONNECTED FOOD  
LOOK LIKE?

do not suggest calling it a food web, tell

AINS WHICH ARE CONNECTED ARE CALLED  
WEB. WHY DO YOU THINK FOOD CHAINS  
LED A FOOD WEB?

web" on the chalkboard.

A FOOD WEB DIFFERENT FROM A FOOD CHAIN?

o students that in a web each living thing  
several paths of food energy, whereas in a  
is only one path.

## ANTICIPATED STUDENT BEHAVIORS

Students:

--infer that the rubber bands represent the  
pathway of energy and that energy is flowing  
from organism to organism.

--respond, "Chart," "Web," "Tangle," "A mess."

  
**ACCEPT ALL  
ANSWERS**

--propose various reasons, such as a tangle of  
interconnecting, weblike pathways for a food web;  
may suggest likeness to a spider web.

--compare the two and indicate that a food chain  
shows only one path of food energy from plants.  
A food web is a network of chains with each link  
connected to many others.

## MATERIALS

## TEACHING STRATEGIES

Now ask:

COULD A MOUNTAIN LION LIVE IN ITS FOREST ENVIRONMENT WITHOUT ANY OTHER ANIMALS?

If students do not indicate a reason, ask:

WHY CAN'T THE MOUNTAIN LION LIVE ALONE?

HOW ABOUT A MOSQUITO? COULD IT LIVE WITHOUT OTHER ANIMALS IN ITS ENVIRONMENT?

WOULD A COW GET ALONG WITHOUT THE OTHER ANIMALS PICTURED?

WOULD THE COW SURVIVE WITHOUT ANY OTHER LIVING THINGS IN ITS ENVIRONMENT?

It is important that students recognize the interdependence of organisms within the food web. Removal of any organism in the web affects other organisms, and in some cases would have disastrous effects on other populations. For example, if the mouse population were destroyed, the hawks would have to find an alternate source of food, leave the area, or starve. Similarly, if all the hawks were killed, the mouse population might grow too large and consume grass which was being used by cows. Fewer cows could then be raised on the area, which would provide less food for organisms eating cow, etc.

## TEACHING STRATEGIES

COULD A MOUNTAIN LION LIVE IN ITS FOREST ENVIRONMENT WITHOUT ANY OTHER ANIMALS?

If students do not indicate a reason, ask:

COULD A MOUNTAIN LION LIVE ALONE?

COULD A MOSQUITO LIVE WITHOUT ANY OTHER ANIMALS IN ITS ENVIRONMENT?

COULD A COW GET ALONG WITHOUT THE OTHER ANIMALS PICTURED?

COULD THE COW SURVIVE WITHOUT ANY OTHER ANIMALS IN ITS ENVIRONMENT?

It is important that students recognize the interdependence of organisms within the food web. Removal of any organism from the web affects other organisms, and in some cases, it can have disastrous effects on other populations. For example, if the mouse population were destroyed, the hawk would have to find an alternate source of food, or it would starve. Similarly, if all the hawks were removed, the mouse population might grow too large and overgraze the grass which was being used by cows. Fewer cows would be raised on the area, which would provide less food for organisms eating cow, etc.

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-18

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Students:

--respond, "No, it wouldn't have any food."

--recall game and worksheet and say, "He needs deer and rabbits for food," "He wouldn't have anything to eat," "He needs food for energy."

--recall game and worksheet, remembering that a mosquito needs blood and that blood comes from animals, therefore the mosquito couldn't live without animals.

--respond, "Yes." Refer to food web board and realize that a cow would eat grain and grass for energy.

--recognize that grass and grain are living things and that cows wouldn't live without them.

ACTIVITY 3-18

MATERIALS

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TEACHING STRATEGIES

Select an organism in the food web which has several rubber bands leading from it and ask:

WHAT WOULD HAPPEN TO THE FOOD WEB IF ALL OF THE (mosquitoes) WERE KILLED?

Set the web board with Worksheet 3-17 on it so that it rests in a vertical position, or hold it vertically in front of you. Remove the mosquito pin so that all rubber bands connected to it pop off and hang down. If the pin has become tangled in the rubber bands, twist it so the bands slip off.

Ask:

WHAT HAS HAPPENED TO OUR FOOD WEB?

Explain to the students that whenever a link in a food web is removed, other living things are affected and the job of food-getting becomes more difficult.

Ask:

IF MOST OF THE (mosquitoes) IN THIS FOOD WEB WERE KILLED, HOW WOULD THE OTHER LIVING THINGS BE AFFECTED? HOW WOULD IT CHANGE THINGS?

## TEACHING STRATEGIES

organism in the food web which has several  
leading from it and ask:

WHAT WOULD HAPPEN TO THE FOOD WEB IF ALL OF  
(mosquitoes) WERE KILLED?

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WHAT HAPPENED TO OUR FOOD WEB?

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web, other living things are affected and the  
getting becomes more difficult.

WHAT WOULD HAPPEN IF ALL OF THE (mosquitoes) IN THIS FOOD WEB  
WERE KILLED, HOW WOULD THE OTHER LIVING THINGS  
BE AFFECTED? HOW WOULD IT CHANGE THINGS?

## ANTICIPATED STUDENT BEHAVIORS

Students:

--recognize and respond that removal of an  
organism would remove the food supply for other  
organisms in the web, and that other animals  
might die or have to find something else to eat.

--recognize that it has been broken.

--respond to indicate that the other living things  
would have to eat more of another kind of living  
thing, that it would be more difficult to get  
food, that some of the other living things might  
die because there was not enough food, etc.

## MATERIALS

## TEACHING STRATEGIES

To culminate this activity and assess student understanding of the interdependence of living things in a food web, follow this strategy. Have Tallysheet 3-9 available to fill out as students take a turn.

Say:

YOU ARE EACH GOING TO HAVE A TURN PULLING A PIN FROM ONE OF THE LIVING THINGS IN ONE OF THE FOOD WEBS YOU HAVE MADE. WE WILL GO ONE AT A TIME AND LISTEN CAREFULLY TO EACH OTHER. DO NOT SELECT A PICTURE THAT SOMEONE HAS ALREADY CHOSEN.

Again focus the students' attention on Worksheet 3-17.

Start with the first student on your class roster and say:

(Student's name), PULL A PIN FROM ONE OF THE LIVING THINGS ON YOUR FOOD WEB.

Ask:

WHAT LIVING THING DID YOU CHOOSE?

WHEN THAT LIVING THING WAS REMOVED OR DIED, DID IT AFFECT THE FOOD WEB?

WHAT ARE ALL THE THINGS THAT MIGHT HAPPEN BECAUSE (name of living thing) IS GONE?

Call on each student on your roster in turn. Ask the same sequence of questions and make the appropriate rating on the tallysheet. When each picture on Worksheet 3-17 has been used, continue the strategy with Worksheet 3-18.

## TEACHING STRATEGIES

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RE EACH GOING TO HAVE A TURN PULLING A FROM ONE OF THE LIVING THINGS IN ONE OF FOOD WEBS YOU HAVE MADE. WE WILL GO ONE TIME AND LISTEN CAREFULLY TO EACH OTHER. T SELECT A PICTURE THAT SOMEONE HAS DY CHOSEN.

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LIVING THING DID YOU CHOOSE?

THAT LIVING THING WAS REMOVED OR DIED, T AFFECT THE FOOD WEB?

ARE ALL THE THINGS THAT MIGHT HAPPEN SE (name of living thing) IS GONE?

ch student on your roster in turn. Ask the same questions and make the appropriate rating on sheet. When each picture on Worksheet 3-17 has c e the strategy with Worksheet 3-18.

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-18

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Students:

--respond by pulling a pin from the food web.

--state which living thing was chosen.

--respond, "Yes," or "No."

--respond by telling how the web was affected, reflecting the interdependence of living things in the web.



**Teacher** \_\_\_\_\_  
**Date** \_\_\_\_\_

UNIT III, CORE C  
TALLY SHEET 3-9: Clues to Success  
ACTIVITY 3-18: "Construction Of A Food Web"

1. Call each student one at a time to the front of the room to remove a pin from his food web board. Ask: WHAT DID YOU REMOVE FROM THE FOOD WEB? Then ask: DOES REMOVING \_\_\_\_\_ MAKE ANY DIFFERENCE FOR THE REST OF THE THINGS IN THE FOOD WEB? If the student says no, circle no in column 1 below. Then ask: WHAT WILL HAPPEN TO ALL THE LIVING THINGS THAT WERE CONNECTED TO \_\_\_\_\_? Score as in #2 below. If the student says yes, ask:
2. WHAT ARE ALL THE THINGS THAT MIGHT HAPPEN TO THE FOOD WEB NOW THAT THE \_\_\_\_\_ IS GONE? In column 2, circle each category of response listed below:
- 0 = no response or no reasonable answer  
1 = appropriate animals would starve or die  
2 = appropriate living things would decrease in number  
3 = appropriate living things would increase in number  
4 = appropriate living things would have to eat other things (optional which might make them scarce as a food source)  
5 = appropriate animals would move to another area.
- Other = briefly write any other idea mentioned that seems reasonable
- If students have only mentioned one or two possible happenings, discuss others with them when you pull a pin after they are done.

[illegible]

5 - appropriate animals would move to another area.

them when you pull a pin after they are done.

### **Other Responses**

UNIT III, CORE C  
ACTIVITY 3-18: "Construction Of A Food Web"

Activity name suggested by class:

Teacher

BSCS USE:	Post	Tally	Rev		
Day 1	Day 2	Day 3	Day 4	Day 5	Day 6

1. Date taught (month and date, e.g. 11/2)					
2. Minutes of class time on science each day					
3. Minutes of preparation each day					
4. Student's absent on each date (Use ID Number)					

5. Interest of class as expressed by apparent attention to what is happening.Number of students responding with: Name students you noted especially:  
(Number)

HIGH INTEREST	_____
MODERATE INTEREST	_____
INDIFFERENCE	_____
MODERATE RESISTANCE	_____
STRONG DISLIKE	_____
HARD TO RATE	_____

6. Equipment in kit: ☐ None ☐ Satisfactory ☐ Too fragile ☐ Too complicated to use ☐ Difficult to use
7. Equipment I got: ☐ None ☐ Easy to get but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is						
Revise slightly						
Revise much						
Worthless: omit						

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:
10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:
11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:
12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?
13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:
14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:

☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless

---keep as is revision suggested major changes described ---drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

7. Equipment I got: ☐ None ☐ Easy ☐ Hard to get ☐ Hard to get ☐ Unobtainable
- needed fragile complicated to use

7. Equipment I got: ☐ None needed ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:
10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:
11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:
12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?
13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:
14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:

☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless  
--keep as is revision suggested major changes described --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed.  
What parts of this activity should be retained when the curriculum is revised:  
Page(s) \_\_\_\_\_:

17. Please complete Tallysheet 3-9 and send in with this feedback form.

18. Be sure you have placed the bean plants in the dark in preparation for Activity 3-20.

19. Concern (or questions) about content:

20. Messages for staff (read immediately):

BSCS Evaluation: EMH Feedback Form 1c

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

SIDE A

UNIT III, CORE C  
ACTIVITY 3-18: "Construction Of A Food Web"

Teacher \_\_\_\_\_

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.



## Me and my Environment

### OBJECTIVE FOCUS FOR THIS ACTIVITY

#### UNIT GOALS:

1. Realize and appreciate the energy interrelationships between organisms.

#### CORE C OBJECTIVES:

3. Realize that all food chains begin with a green plant.
9. Appreciate the interrelationships of organisms in a food web.
10. Understand the consequences that the removal of an organism has on a food web.

### MATERIALS

### TEACHING STRATEGIES

#### Activity 3-19. Nature's Delicate Balance--Review Of Success

*This review of success is divided into two parts. In the first part, students answer two questions on a worksheet to show their understanding of food chains and food webs. Following discussion of these questions, students participate in creating a story for a booklet of pictures about nature's delicate balance. Use this activity to help students understand how much they have learned in the preceding activities.*

**FOCUS FOR THIS ACTIVITY****GOALS:**

1. Realize and appreciate the energy interrelationships between organisms.

**OBJECTIVES:**

3. Realize that all food chains begin with a green plant.
9. Appreciate the interrelationships of organisms in a food web.
0. Understand the consequences that the removal of an organism has on a food web.

**TEACHING STRATEGIES****3-19. Nature's Delicate Balance--Review Of Success**

of success is divided into two parts. In the first part, students answer two questions on a worksheet about their understanding of food chains and food webs. In the second part, after a discussion of these questions, students participate in creating a story for a booklet of pictures about nature's delicate balance. Use this activity to help students understand how much they have learned in previous activities.

**UNIT III.****ENERGY RELATIONSHIPS  
IN MY ENVIRONMENT****CORE C.****ENERGY FLOW THROUGH  
FOOD CHAINS AND WEBS****BSCS****ACTIVITY 3-19. NATURE'S DELICATE BALANCE--  
REVIEW OF SUCCESS****ANTICIPATED STUDENT BEHAVIORS**

At the end of this activity, each student should:

- have answered and discussed the two questions on Worksheet 3-19.
- have identified the illustrations in the pamphlet.
- have participated in creating a story to accompany the illustrations in the pamphlet.
- have identified food chains and webs in the pamphlet.
- have demonstrated an understanding of the interdependence of living things in a food web by participating in class discussions and diagramming at the chalkboard.

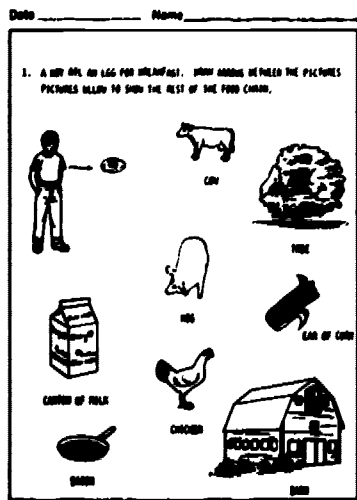
# ACTIVITY 3-19

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## MATERIALS

Worksheet 3-19  
Slides 3-35 and 3-36  
\*35mm Slide projector  
Booklet (*Nature's Delicate Balance*)

### Slide 3-35



## TEACHING STRATEGIES

### Part I.

Distribute Worksheet 3-19 and have each student put his name on it. Tell the students that each should answer the two questions for himself as they are read aloud, and then all of them can discuss the questions together.

Project each question separately. Read the questions aloud and allow ample time for the students to mark their worksheets.

After students have answered both questions, collect the worksheets. Then project each slide and discuss their answers. Have them defend their choices. If students are confused, allow more practice with the food web boards. Then proceed with the next part. After class, tally student responses on Tallysheet 3-10.

### Part II.

Begin by having students recall the previous activity of constructing food webs.

Then ask:

WHAT DID THE RUBBER BANDS SHOW?

WHAT DID WE SHOW WHEN WE EACH PULLED A PIN FROM THE CARDBOARD?

\*Not furnished in materials kit



## TEACHING STRATEGIES

Worksheet 3-19 and have each student put his  
Tell the students that each should answer  
questions for himself as they are read aloud, and  
of them can discuss the questions together.

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ng food webs.

DID THE RUBBER BANDS SHOW?

DID WE SHOW WHEN WE EACH PULLED A PIN  
THE CARDBOARD?

## ANTICIPATED STUDENT BEHAVIORS

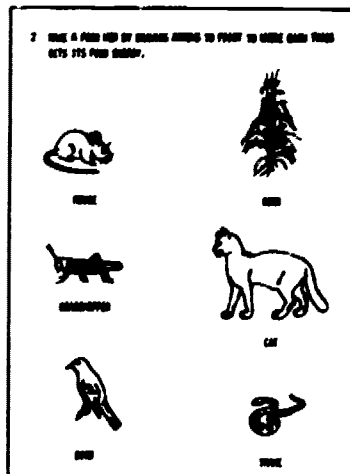
Students:

--respond, "Which animal eats what," "Where the  
animals get their food energy," etc.

--respond, "An animal died," "The other animals had  
to get their food somewhere else," "That there  
wasn't enough food," or any response which shows  
an understanding of the interdependence of living  
things.

## MATERIALS

Slide 3-36



## TEACHING STRATEGIES

Say:

TODAY YOU WILL EACH GET A BOOKLET, BUT  
YOU WILL NOTICE SOMETHING ABOUT IT THAT  
IS DIFFERENT FROM MANY BOOKLETS.

Have a student distribute the booklets.

WHEN YOU GET YOUR BOOKLET, LOOK AT EACH  
PAGE AND SEE IF YOU CAN DISCOVER HOW IT  
IS DIFFERENT FROM OTHERS YOU HAVE SEEN.

Then ask:

WHAT DO YOU SEE THAT MAKES THESE BOOKLETS  
DIFFERENT FROM OTHERS YOU HAVE SEEN?

LOOK CAREFULLY AGAIN AT EACH PAGE AND  
TRY TO FIGURE OUT WHAT IS HAPPENING IN  
EACH PICTURE.

ACCEPT ALL  
ANSWERS

GIVE STUDENTS  
TIME  
TO  
THINK

## TEACHING STRATEGIES

YOU WILL EACH GET A BOOKLET, BUT  
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ent distribute the booklets.

U GET YOUR BOOKLET, LOOK AT EACH  
D SEE IF YOU CAN DISCOVER HOW IT  
ERENT FROM OTHERS YOU HAVE SEEN.

YOU SEE THAT MAKES THESE BOOKLETS  
NT FROM OTHERS YOU HAVE SEEN?

REFULLY AGAIN AT EACH PAGE AND  
FIGURE OUT WHAT IS HAPPENING IN  
CTURE.

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-19

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Students:

--look through their booklets.

--remark that there are no words to the story.

  
**ACCEPT ALL  
ANSWERS**

**GIVE STUDENTS  
TIME  
TO  
THINK**

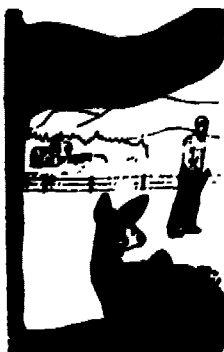
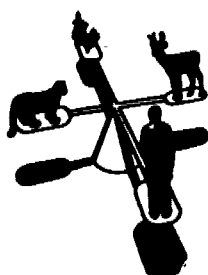


# ACTIVITY 3-19

## MATERIALS

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Language Stories Curriculum Book



## TEACHING STRATEGIES

Now go through the booklet page by page, eliciting many ideas and descriptions of what students see on each page. The sequence of questions below will help to guide the discussion. Help students develop their ideas, observe, describe, and verbalize.

Begin with the cover, asking students what they observe. If students do not point out the blank lines, tell them that they are going to be making up their own title at the end of class.

Page 1: WHAT KIND OF ENVIRONMENT DO YOU SEE?  
WHAT KINDS OF SOUNDS MIGHT YOU HEAR?  
WHAT NAME COULD WE GIVE THE BOY?

Page 4: WHAT IS (boy's name) THINKING IN THE  
FIRST PICTURE? IN THE SECOND PICTURE?

Pages 5-7: DO YOU THINK THIS COULD HAPPEN? HAVE  
YOU EVER MADE FRIENDS WITH AN ANIMAL?

Page 8: WHAT DO YOU SUPPOSE THE FATHER IS  
TELLING (boy's name) AND THE MOTHER?  
WHAT COULD BE DONE TO PREVENT THIS  
FROM HAPPENING? WHERE WAS THE MOUNTAIN  
LION GETTING HIS FOOD ENERGY? WHO ELSE  
GETS ENERGY FROM COWS? WHY WERE THE  
MOUNTAIN LIONS EATING THE COWS INSTEAD  
OF DEER?

## TEACHING STRATEGIES

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WHAT KINDS OF SOUNDS MIGHT YOU HEAR?  
WHAT NAME COULD WE GIVE THE BOY?

WHAT IS (boy's name) THINKING IN THE  
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7: DO YOU THINK THIS COULD HAPPEN? HAVE  
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MOUNTAIN LIONS EATING THE COWS INSTEAD  
OF DEER?

## ANTICIPATED STUDENT BEHAVIORS

## MATERIALS



## TEACHING STRATEGIES

- Pages 9-10: WHAT DID THE MEN DECIDE TO DO? WHAT WILL HAPPEN TO THE FOOD CHAIN? HOW ELSE COULD THE RANCHERS HAVE STOPPED THE LIONS FROM KILLING THEIR COWS?
- Page 11: DID IT HELP TO SOLVE THE PROBLEM?
- Page 12: HOW MUCH TIME HAS PASSED?
- Page 13: WHY DID (boy's name) KEEP SEEING MORE DEER EACH TIME HE WENT INTO THE FOREST?
- Page 14: WHY DID SO MANY DEER DIE? WHAT HAPPENED TO THE FOOD CHAIN? WOULDN'T THE DEER HAVE DIED SOMETIME ANYWAY? IF OTHER PEOPLE NOTICED THAT THE DEER WERE INCREASING, WHAT COULD HAVE BEEN DONE TO PREVENT THE DEATH OF SO MANY DEER?
- Page 15: WHY DID MORE LEAVES DISAPPEAR FROM THE TREES? WHY IS THE GRASS SO SHORT? WHERE DO THE DEER GET THEIR FOOD ENERGY?
- Page 16: WHICH DEER IS THIS? HOW DO YOU THINK (boy's name) FELT? HOW WOULD YOU FEEL? PEOPLE GO HUNTING ALL THE TIME. WHY WAS IT SO BAD FOR THE RANCHERS TO KILL THE LIONS?
- Page 17: WHAT IS (boy's name) ASKING HIS DAD? WHY DID SO MANY DEER DIE?

## TEACHING STRATEGIES

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-19

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Q: WHAT DID THE MEN DECIDE TO DO? WHAT  
WILL HAPPEN TO THE FOOD CHAIN? HOW  
ELSE COULD THE RANCHERS HAVE STOPPED  
THE LIONS FROM KILLING THEIR COWS?

DID IT HELP TO SOLVE THE PROBLEM?

HOW MUCH TIME HAS PASSED?

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(boy's name) FELT? HOW WOULD YOU FEEL?  
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WAS IT SO BAD FOR THE RANCHERS TO KILL  
THE LIONS?

WHAT IS (boy's name) ASKING HIS DAD?  
WHY DID SO MANY DEER DIE?

ACTIVITY 3-19

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MATERIALS



TEACHING STRATEGIES

Have students tell you the names of the living things in the story. Write them on the chalkboard:

"mountain lion, man, cow, deer, grass, and shrubs."



Have students think of the food chains and webs. Select students to draw in lines to illustrate these relationships and tell their classmates what the lines show. Then select students to come up and erase the living things as they were killed or died. Encourage them to verbalize the interrelationships of the living things in the food web.

Conclude the activity by having students suggest titles for the story. Remind them that the title should be based on the main ideas they have discussed in the story. If necessary, review the main ideas. Allow each student to make up his own title and write it on his pamphlet. Assist with spelling as necessary.

Outlined below is one version of the story depicted in the pamphlet. There are variations which the students may develop, but this version offers the story flow and concepts which should be included.

THE BALANCE OF NATURE

There was once a boy, about your age, who lived on a ranch at the edge of a forest. When he was done with his chores each day, one thing he enjoyed doing was walking through the forest.



## TEACHING STRATEGIES

Students tell you the names of the living things in the story. Write them on the chalkboard:

"A lion, man, cow, deer, grass, and shrubs."



Students think of the food chains and webs. Select a student to draw in lines to illustrate these relationships. Tell their classmates what the lines show. Then students take turns to come up and erase the living things as they are killed or died. Encourage them to verbalize the relationships of the living things in the food web.

Begin the activity by having students suggest titles for the story. Remind them that the title should be the main idea of the story. Review the main ideas. Allow each student to write his own title and write it on his pamphlet. Check spelling as necessary.

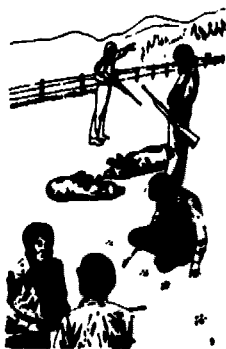
Below is one version of the story depicted in the story. There are variations which the students can use, but this version offers the story flow and which should be included.

### THE BALANCE OF NATURE

There was once a boy, about your age, who lived on a ranch at the edge of a forest. When he was finished with his chores each day, one thing he liked doing was walking through the forest.

## ANTICIPATED STUDENT BEHAVIORS

## MATERIALS



## TEACHING STRATEGIES

He enjoyed this particular forest because it was full of plants and animals and very beautiful. He enjoyed looking for new things and hearing new sounds. One day as he was strolling through the forest, he saw the carcass of a deer. At first he was rather disturbed that any person or any animal would want to kill a deer. But then he thought of the many mountain lions that had to hunt food for their cubs to eat. When he realized that the deer was killed so that some other animal would have food, he felt much better.

As he continued his walk, he suddenly noticed a beautiful white-tailed deer peering from behind a tree. But as soon as the deer realized the boy was watching it, it quickly ran away. About a week later when the boy was again walking in the forest, he saw what looked like the same deer. But this time the deer stayed a little longer before dashing away. It was almost as if he recognized the boy and wasn't quite so afraid of him.

A week later, while the boy was walking through the forest, he saw the deer again. This time the boy kept walking closer and closer to the deer. He was very surprised when the deer allowed him to touch it ever so slightly before it ran away. That evening when the boy came home he walked in the door to find his father very upset about something. His father was explaining to his mother that the livestock of neighboring ranchers had been killed by mountain lions from the forest. When the boy woke up the next morning he heard from his father that a group of ranchers had taken their guns and gone on a hunting party looking for mountain lions to kill.

## TEACHING STRATEGIES

enjoyed this particular forest because it was full of plants and animals and very beautiful. He enjoyed looking for new things and hearing the sounds of the forest. One day as he was strolling through the forest, he saw the carcass of a deer. At first, he was rather disturbed that any person or animal would want to kill a deer. But then he thought of the many mountain lions that had to hunt food for their cubs to eat. He realized that the deer was killed so that some other animal would have food, he felt much better.

As he continued his walk, he suddenly noticed a beautiful white-tailed deer peering from behind a tree. But as soon as the deer realized the boy was watching it, it quickly ran away. A week later when the boy was again walking in the forest, he saw what looked like the same deer. But this time the deer stayed a little longer before dashing away. It was as if he recognized the boy and wasn't so afraid of him.

A few days later, while the boy was walking through the forest, he saw the deer again. This time he kept walking closer and closer to the deer. He was very surprised when the deer allowed him to touch it ever so slightly before running away. That evening when the boy came home, he walked in the door to find his father very upset about something. His father was telling him and his mother that the livestock of the neighboring ranchers had been killed by mountain lions from the forest. When the boy woke up the next morning he heard from his father that a group of hunters had taken their guns and gone on a hunt looking for mountain lions to kill.

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-19

169

ACTIVITY 3-19

170

MATERIALS



17



TEACHING STRATEGIES

Later that day the boy saw the ranchers coming out of the forest dragging many dead lions behind them. The ranchers were now very happy because no more of their livestock had been killed by the lions.

Winter passed and spring came. As the snows melted and the weather became warmer, the boy began his walks in the forest again. This time when he walked, he noticed a great number of deer around, many more than he had seen the year before. Another thing he noticed was that there didn't seem to be as much underbrush as the year before. The branches from the trees had the bottom leaves stripped from them. This spring he saw no deer that had been killed by mountain lions.

Later in the summer the boy began to notice that the deer he saw looked very skinny. He could even see their bones sticking out. When he came to the open meadows in the forest the grasses were chewed down so low that more dirt than grass was showing.

Fall came and the boy started school again and continued through the winter. When spring finally came again he was very anxious to get out into the forest.

## TEACHING STRATEGIES

that day the boy saw the ranchers coming  
from the forest dragging many dead lions  
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because no more of their livestock had been  
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When fall came and the boy started school again and  
continued through the winter. When spring finally  
came again he was very anxious to get out into  
the forest.

## ANTICIPATED STUDENT BEHAVIORS

## MATERIALS



## TEACHING STRATEGIES

What he saw did not make him happy at all. He did not see any live deer but only carcasses of deer. New buds on the trees were already nipped off and the forest was strangely quiet. The boy began looking for the one deer that had always allowed him to come close. He continued walking through the forest searching for his deer but when he found the deer he was very sad. His friend, the deer, had also died. He started home slowly. When he arrived, he asked his father why all this had happened. Why did so many of the deer die?

### Extension of this activity:

1. Each student may write his own story to accompany the pictures in the pamphlet.
2. The students may help to develop a class story to accompany the pictures in the pamphlet. You may then write the story on an experience chart to develop language arts activities or type and duplicate it for each student.

## TEACHING STRATEGIES

...saw did not make him happy at all. He  
...see any live deer but only carcasses of  
...new buds on the trees were already nipped  
...the forest was strangely quiet. The  
...an looking for the one deer that had  
...allowed him to come close. He continued  
...through the forest searching for his  
...t when he found the deer he was very sad.  
...end, the deer, had also died. He started  
...owly. When he arrived, he asked his  
...why all this had happened. Why did so  
...the deer die?

For this activity:

...student may write his own story to  
...any the pictures in the pamphlet.

...students may help to develop a class  
...to accompany the pictures in the pamphlet.  
...y then write the story on an experience  
...to develop language arts activities or  
...and duplicate it for each student.

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-19

(171)

Teacher \_\_\_\_\_  
Date \_\_\_\_\_

**UNIT III, CORE C**  
**TALLYSHEET 3-10: Tally of Worksheet 3-19**  
**ACTIVITY 3-19: "Nature's Delicate Balance" (Review Of Success)**

**Tally each student's responses to the two questions as indicated below.**

Question 1: In column 1 check yes if the following complete food chain is made, with arrows pointing in the appropriate direction: boy  $\rightarrow$  egg  $\rightarrow$  hen  $\rightarrow$  corn. If chain is correct except for direction of arrows, check  $\leftarrow$ . If chain is incorrect, check no and complete column 2 showing the arrows drawn by the student.

**Question 2. See back of tallysheet.**

[illegible]

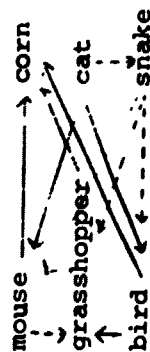


[illegible]

**TOTALS:**

TALLY SHEET 3-10: Tally of Worksheet 3-19

Question 2: Make a check in the appropriate column for each arrow correctly drawn in the correct direction. If another arrow was drawn from the animal than those shown, name the thing to which it points. There are eleven possible arrows as shown but one arrow from each of the five animals to an acceptable food would be an excellent response.



Dotted lines indicate less likely, but possible connections.

This item calls on knowledge of what things eat, an understanding of food chains, and an understanding that some things can be part of many food chains. Any student that draws more than three correct arrows had learned a good deal.

When the questions have been discussed and lines are drawn in on the projected slide on the chalkboard, ask: WHAT DOES EVERYTHING IN THE FOOD WEB DEPEND ON?

Attach ID list here.	Grass-									
	Mouse		to hopper		to Bird		to Cat		to Snake	
	Corn or Grass- hopper	Other	Corn	Other	Grass- hopper or corn	Other	Mouse, Bird or Snake	Other	Mouse, Grass- hopper or Bird	Other
01										

Attach ID  
list here.

01

Mouse		to		hopper		to		Bird		to		Cat		to		Snake		to	
Corn or Grass-hopper		Other		Corn		Other		Grass-hopper or corn		Other		Mouse, Bird or Snake		Other		Mouse, Grass-hopper or Bird		Other	

TOTAL CORRECT  
RESPONSES: \_\_\_\_\_

Does this review give an accurate indication of student understanding?  
If not, what other evidence do you have of student learning?

☐ Yes

☐ No

UNIT III, CORE C  
ACTIVITY 3-19: "Nature's Delicate Balance" (Review Of Success)

Activity name suggested by class: \_\_\_\_\_ Teacher \_\_\_\_\_

BSCS USE: Post \_\_\_\_\_ Tally \_\_\_\_\_ Rev \_\_\_\_\_

Day 1 Day 2 Day 3 Day 4 Day 5 Day 6

1. Date taught (month and date, e.g. 11/2)						
2. Minutes of class time on science each day						
3. Minutes of preparation each day						
4. Students absent on each date (Use ID Number)						

5. Interest of class as expressed by apparent attention to what is happening.

Number of students responding with: Name students you noted especially:

HIGH INTEREST	_____	_____	_____	_____	_____
MODERATE INTEREST	_____	_____	_____	_____	_____
INDIFFERENCE	_____	_____	_____	_____	_____
MODERATE RESISTANCE	_____	_____	_____	_____	_____
STRONG DISLIKE	_____	_____	_____	_____	_____
HARD TO RATE	_____	_____	_____	_____	_____

6. Equipment in kit: ☐ None ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use
7. Equipment I got: ☐ None ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is						
Revise slightly						
Revise much						
Worthless: omit						

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:
10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:
11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:
12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?
13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:
14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity: ☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless
- keep as is-----revision suggested-----major changes described-----drop it-----
- SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

needed fragile complicated to use

Equipment I got: ☐ None ☐ Easy ☐ Hard to get, ☐ Hard to get, ☐ Unobtainable, needed to get but okay add to kit add to kit

8. Materials used:

	Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:
10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:
11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:
12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?
13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:
14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:
15. Your rating of this activity:  
☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless  
 -----keep as is revision suggested major changes described -----drop it-----  
 SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed.  
 What parts of this activity should be retained when the curriculum is revised?  
 Page(s) \_\_\_\_\_:

17. Did any student give away the answer to either question on Worksheet 3-19?  
☐ No ☐ Yes: Comment.

18. Did any students have difficulty creating a story for the booklet?  
☐ No ☐ Yes: Comment.

19. Please complete Tallysheet 3-10 and send in with this feedback form.

20. Concern (or questions) about content:

21. Messages for staff (read immediately):

BSCS Evaluation: EMH Feedback Form 1c

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

UNIT III, CORE C  
ACTIVITY 3-19: "Nature's Delicate Balance" (Review Of Success)

Teacher \_\_\_\_\_

## REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

## THE LESSON

- |  |  |
|--|--|
| <input type="checkbox"/> how you organized materials or class.   | <input type="checkbox"/> who had problems and what they were.            |
| <input type="checkbox"/> things added (a question, a picture, etc.).   | <input type="checkbox"/> how someone "caught on" (or who never did).     |
| <input type="checkbox"/> equipment, supplies, visual aids.   | <input type="checkbox"/> who was really "turned off" (or on).            |
| <input type="checkbox"/> things that went wrong, misunderstandings.  | <input type="checkbox"/> reactions of parents, teachers, students.       |
| <input type="checkbox"/> what you would do differently or avoid next time.   | <input type="checkbox"/> special evidence of learning or applying ideas. |
| <input type="checkbox"/> turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them. |  |

## THE STUDENTS

UNIT III  
REACTIONS TO CORE C

1. Was the background information for this core adequate? ☐ Yes ☐ No  
Comment:
  
2. Was it clear to you why these particular activities were chosen and the direction they were leading? ☐ Yes ☐ No  
Comment:
  
3. Did the activities fulfill the purposes stated in the Guide for this core? ☐ Yes ☐ No  
Comment:
  
4. How would you increase the clarity of this core for students? (Help them understand why they are doing these activities.)
  
5. Is there a practical (take-home) value for your students in these activities? ☐ Yes ☐ No
6. If yes, what do you see as the "take-home" lesson? If no, what is needed?
  
7. In these materials, what things did your students find difficult to do?
  
8. Should there be more clues to success or reviews of success in this core? ☐ Yes ☐ No  
Comment:
  
9. Was there too much reading and too many teacher directions? ☐ Yes ☐ No  
Comment:
  
10. Did you make use of the Planning Guide? ☐ Yes ☐ No  
Comment:

5. Is there a practical (take-home) value for your students in these activities? ☐ Yes ☐ No  
 6. If yes, what do you see as the "take-home" lesson? If no, what is needed?

7. In these materials, what things did your students find difficult to do?

8. Should there be more clues to success or reviews of success in this core? ☐ Yes ☐ No  
 Comment:

9. Was there too much reading and too many teacher directions? ☐ Yes ☐ No  
 Comment:

10. Did you make use of the Planning Guide? ☐ Yes ☐ No  
 Comment:

11. If you could teach your way, rather than following the Guide, how would you do it?

12. Which of your students do you believe were unsuccessful in achieving the objectives of this core of activities? Explain.

BSCS Evaluation: EMH Feedback Form 2a



# NEW STUDENTS ENTERING DURING THIS CORE

Date Entered	Last Name	Name Used	Ethnic Group	Sex	Birthdate	Test date	Test	Total
			W B S O	M F			W B O	
			W B S O	M F			W B O	
			W B S O	M F			W B O	
			W B S O	M F			W B O	

## STUDENTS DROPPED IN THIS PERIOD

Date Dropped	Last Name	First

W = white  
 B = black  
 S = Spanish-American  
 O = other

W = WISC  
 B = Binet  
 O = other (name)

ADDITIONAL INFORMATION ON NEW STUDENTS:

NEW STUDENTS ENTERING DURING THIS CORE

Group	Sex	Birthdate	Test date	Test	Total	Verbal	Performance	Previous Test Score
S O	M F			W B O				
S O	M F			W B O				
S O	M F			W B O				
S O	M F			W B O				

W = WISC  
 B = Binet  
 O = other  
 (name)

SIDE B



## Me and my Environment

### UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

#### CORE D. FOOD MAKING IN PLANTS

#### AIMS FOR ME AND MY ENVIRONMENT

1. DEVELOPMENT IN EACH CHILD OF A SENSE OF IDENTITY AS A PERSON WHO HAS SOME DEGREE OF CONTROL OVER AND CAN ACT ON HIS ENVIRONMENT. This will lead to a degree of self-determination based on a rational coping with situations rather than on a passive compliance or an impulsive response to problems.
2. DEVELOPMENT IN EACH CHILD OF A SUCCESS SYNDROME. More than anything else, each activity is intended to be a success experience for each child. It is the teacher's responsibility -- almost obligation -- to see that each child succeeds at a level that is challenging to his abilities and that preserves his self-respect. It is a further responsibility of the teacher to point out his achievement. The students as a group should help each individual fit what he has done into a pattern of accomplishment.
3. DEVELOPMENT IN EACH CHILD OF AN INTEREST THAT COULD BECOME A HOBBY OR AVOCATION OVER A LIFETIME (through an exposure to an array of experiences in science). It is hoped that many children will find some area -- perhaps growing plants, caring for animals, identifying flowers, collecting things, or simply enjoying outings into the country -- that they feel strongly about and can develop some competence or knowledge in. This would provide a means of self-expression, and (perhaps) allow some degree of sharing or involvement with others.
4. DEVELOPMENT IN EACH CHILD OF A SENSE OF RELATIONSHIP AND EMPATHY WITH OTHER LIVING THINGS. It is hoped that this will lead to a positive regard and caring about what affects them as individuals and as a group, because what affects them affects the community of man.
5. DEVELOPMENT IN EACH CHILD OF AN UNDERSTANDING OF ENVIRONMENTAL CONDITIONS that will lead to a sense of responsibility for the environment and actions that protect or improve it.

1. Realize and appreciate the energy relationships in the environment.
2. Appreciate and understand man's role in the environment.

- OBJECTIVES
1. Determine that plants contain food energy.
  2. Conclude that plants can make their own food and that this process prevails.
  3. Infer that the sun provides the energy for plants to make food.
  4. Determine that in the absence of light, plants cannot make food.
  5. Determine that without air, plants cannot make food.
  6. Determine that in the absence of carbon dioxide, plants cannot make food.
  7. Appreciate the role of green plants in the living world.

UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

CORE D. FOOD MAKING IN PLANTS



BSCS

UNIT III GOALS

1. Realize and appreciate the energy interrelationships between organisms.
2. Appreciate and understand man's dependence on green plants for food.

OBJECTIVES OF CORE D

1. Determine that plants contain food.
2. Conclude that plants can make their own food when certain environmental conditions prevail.
3. Infer that the sun provides the energy upon which man and other life depends.
4. Determine that in the absence of light, plants are unable to make food.
5. Determine that without air, plants are unable to make food.
6. Determine that in the absence of "green stuff" (chlorophyll), plants are unable to make food.
7. Appreciate the role of green plants in supplying food to the remainder of the living world.

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## Me and my Environment

### UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

#### CORE D. FOOD MAKING IN PLANTS

##### CORE D RATIONALE

Most green plants do not capture and eat animals or other plants for food. Yet, as a living organism, a plant requires food. Where, then, does a plant obtain its food? Over 300 years ago a scientist, Jean Baptiste van Helmont, asked the same question in a classical experiment (which the students consider briefly). Van Helmont concluded that a tree growing in a tub of soil did not "eat" or use any of the soil. Scientists have learned quite a bit since van Helmont's time. We now know that green plants make their own food, mainly from air, water, and light.

Green plants are the primary food makers of the living world. They are able to utilize sunlight for manufacturing food, which can in turn be utilized by animals that feed on the plants. The process of utilizing sunlight for manufacturing food is called photosynthesis. Photosynthesis is the only way that energy is made available for life on the Earth. Without green plants, life as we know it would disappear from our planet.

It is the purpose of this core to focus the attention of the students on this interaction between green plants and their environment. There are several things in the environment that influence the process of photosynthesis in plants. The main product of photosynthesis is sugar, which is almost immediately converted to starch. It is this starch that supplies the plant, and organisms feeding on plants, with energy.

We can list the things from the environment we think are necessary for plant life and then proceed to determine if they are indeed necessary in the food-making process. Attention at the beginning of the core is focused on a chart picturing a living plant. Surrounding the plant are five incomplete areas identifying those factors which might be considered important in the food-making process: soil, air, light,

##### BACKG

The process of food to the living world. In and food materials are ing that plants, as living 3-20 (Hungry Plants), t cerned directly or indirectly food-making process.

At one time man took from the soil. After m classic experiment of v 3-20, it was eventually manufacture their food. to grow. It anchors th growth are absorbed fro added to water. Because is not possible to demon water in making food. make them grow, it shou involved in the food-ma

To manufacture is food synthesis takes pla process is called photo complicated process -- for the purposes of this

AIR + WATER

### UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

#### CORE D. FOOD MAKING IN PLANTS



BSCS

#### BACKGROUND INFORMATION FOR THE TEACHER

The process of food manufacturing by plants is extremely important to the living world. It is about the only process whereby both energy and food materials are made available to living things. After establishing that plants, as living things, need food for energy in Activity 3-20 (Hungry Plants), the remainder of the activities in Core D are concerned directly or indirectly with the very general requirements of the food-making process.

At one time man thought that plants obtained their food already made from the soil. After much observation and experimentation, such as the classic experiment of van Helmont that is briefly mentioned in Activity 3-20, it was eventually recognized that plants, unlike animals, must manufacture their food. The soil serves primarily as a place for a plant to grow. It anchors the plant. Certain minerals necessary for plant growth are absorbed from the soil, but these could just as easily be added to water. Because it requires rather sophisticated equipment, it is not possible to demonstrate to the students the role and necessity of water in making food. Because they have added water to their plants to make them grow, it should be obvious to the students that the water is involved in the food-making process.

To manufacture is to synthesize or put together, and since plant food synthesis takes place only in the presence of light, the entire process is called photosynthesis. While photosynthesis is a very complicated process -- its study is the life's work of many scientists -- for the purposes of this program it can be summarized as follows:

AIR + WATER    LIGHT + "GREEN STUFF" → FOOD (STARCH)



## Me and my Environment

### UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

#### CORE D. FOOD MAKING IN PLANTS

##### CORE D RATIONALE (continued)

water, and "green stuff" (chlorophyll). Each area is then examined and/or discussed in the activities which follow. By the time the core has been completed, the students have helped to fill in the blank areas on the chart designating the contribution of each factor.

Activity 3-20 (Hungry Plants) establishes that plants need food for energy just as animals do. Soil is identified as a factor in the plant's environment, but the point is made that it is not "eaten" or used up by the plant as it grows. Water is also shown to be necessary for growth, but it is made apparent that the water does not by itself supply energy.

While food comes in a variety of forms in the plant world, starch is one of the most common and the most easily detected by testing. Activity 3-21 (Testing For Starch) provides the student with a simple and easily recognizable means by which the presence of starch may be detected in the leaves of plants. This is necessary in order to determine whether or not food is actually produced when certain environmental factors thought to be involved in food production are controlled.

By partially covering the leaves of plants in Activity 3-22 (Sun Spots) the student is able to observe the resulting effect on starch production in that portion of the leaf that is deprived of sunlight. Those spots or leaf areas that have been exposed to light will show the presence of starch in sharp contrast to the covered portions of the leaf. In Activity 3-23 (Plants Have An Air About Them), again using the starch test, the students can see that leaves which have been deprived of air do not produce food. The same point is made about chlorophyll in Activity 3-24 (The Green Machine). Variegated geraniums or coleus plants are tested for starch and are found to contain food only in those portions of the leaves which contain

##### BACKGROUND

Simple sugar is but is normally converted to starch is easy to detect of food in plants. food as any substance release of energy, of body processes. proteins, water, minerals of energy and are called Minerals and vitamins important in maintaining directs the student iodide (IKI) solution a very obvious and in the food material black, or blue-black that starch is not

In Activity 3-24 has been covered to the sun is released on Earth comes from green leaf prevents Machine) uses the student plant convert the starch photosynthesis can chlorophyll. The chlorophyll is able to "capture" the water and carbon dioxide process.

# UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

## CORE D. FOOD MAKING IN PLANTS



BSCS

### BACKGROUND INFORMATION FOR THE TEACHER (continued)

Simple sugar is the first food product produced in photosynthesis but is normally converted to starch as it is formed. Since the test for starch is easy to do it is most often used in establishing the presence of food in plants. It is important to realize that scientists define food as any substance taken into the body that can be utilized for the release of energy, building and repair of tissues, or for regulation of body processes. This broad definition includes carbohydrates, fats, proteins, water, minerals, and vitamins. The first three can be sources of energy and are considered foods for the purposes of this program. Minerals and vitamins, like water, do not supply energy but are equally important in maintaining life. Activity 3-21 (Testing For Starch) directs the students in using the starch test. When iodine potassium iodide (IKI) solution is applied to a food substance containing starch, a very obvious and characteristic color change takes place. The starch in the food material, when exposed to IKI solution, becomes very dark, black, or blue-black. Negative results, or no color change, indicate that starch is not present.

In Activity 3-22 (Sun Spots) the student tests a leaf for starch that has been covered to prevent light from reaching it. Energy produced in the sun is released as solar radiation. Since all energy stored in food on Earth comes from this radiation, preventing the sun from reaching the green leaf prevents the formation of starch. Activity 3-24 (The Green Machine) uses the starch test to show that only the green portions of a plant convert the sun's energy to starch. We know this is true because photosynthesis can occur only in the presence of the green pigment, chlorophyll. The chlorophyll molecule has the unique property of being able to "capture" the sun's energy and use it to combine the atoms of water and carbon dioxide, forming new energy-rich food compounds in the process.





## Me and my Environment

### UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

#### CORE D. FOOD MAKING IN PLANTS

##### CORE D RATIONALE (continued)

"green stuff" (chlorophyll). From these activities, then, it can be inferred that food-making in plants occurs only when certain conditions prevail. The chart, which focused on plant needs at the beginning of the core, will then be completed. Those factors considered important in the food-making process have been investigated and conclusions have been drawn.

It is hoped that these activities will enhance the students' appreciation of the role of plants in the environment. Will they appreciate the sun a little more if they realize this is associated with energy in food? Will their lives be richer if they can look at a green field, a tree, or a scenic picture of the outdoors and know why plants are green? Will they be able to care for plants, a garden, or a lawn better if they have some understanding of plant needs? It is the intent of this program that through these experiences they will be closer to achieving those rather intangible goals which are so important for a meaningful life.

##### BACKGROUND

Activity 3-23 (Plants, the Sun, and Air) shows that without air the plant will not live. It also shows that not everything that we see is a plant. Carbon dioxide is an important component. Carbon dioxide is an organic starch molecule.

The process of photosynthesis can be reviewed and summarized.

1. CARBON DIOXIDE + WATER
2. Plants, like other organisms, need light.
3. Plants change light energy into chemical energy.
4. Water and air (carbon dioxide) are used in photosynthesis. These are the raw materials.
5. Inside the plant, in the chloroplasts, the raw materials are converted into food (starch) and oxygen.
6. The function of chlorophyll is to absorb light energy.

### UNIT III. ENERGY RELATIONSHIPS IN MY ENVIRONMENT

#### CORE D. FOOD MAKING IN PLANTS



BSCS

#### BACKGROUND INFORMATION FOR THE TEACHER (continued)

Activity 3-23 (Plants Have An Air About Them) demonstrates that without air the plant would be unable to make food. As indicated above, not everything that we call air is involved, only the carbon dioxide component. Carbon dioxide provides the carbon used in constructing the organic starch molecule.

The process of photosynthesis and its importance to living things can be reviewed and summarized as follows:


1. CARBON DIOXIDE + WATER + CHLOROPHYLL + LIGHT PRODUCE → FOOD (STARCH)
2. Plants, like other living things, need food for energy.
3. Plants change light energy from the sun into food energy.
4. Water and air (carbon dioxide) are the raw materials for photosynthesis. These come from the plant's environment.
5. Inside the plant, in the presence of chlorophyll, these two raw materials are converted to sugar, and then usually to starch.
6. The function of chlorophyll is to "trap" the light energy.



## Me and my Environment

UNIT III  
CORE D

## PLANNING GUIDE

NOTE: Some activities (indicated in italics and an  in the margin) should be prepared several days or weeks in advance. Use this guide to develop a teaching and preparation schedule. All supplies needed are listed in the table.

Activity Number, Page, Tentative Teaching Date	Check List of Supplies Needed		(Italics and arrows indicate items to be prepared in advance)
	Materials You Furnish	Materials in Supply Kit	
3-20. Hungry Plants  Page _____ Date planned _____	35mm Slide projector Paper clips Black construction paper	Chart Camera (Polaroid Square Shooter) Slide 3-37 Slide 3-38 Slide 3-39 Slide 3-40	One box Enough to make "The Living Planet"  Plant Entering Plant At Supermarket Plant Eating A Willow Tree in Note: Step 2 of now
3-21. Testing For Starch  Page _____ Date planned _____	Geranium plants  Cornstarch Food samples  Green construction paper Black construction paper	Starch test solution  Hot plate 1000 ml Beaker 250 ml Beaker 70% Alcohol Forceps Petri dish Camera (Polaroid Square Shooter)	These should be prepared in advance for Activity 3-21 One box Examples include cottage cheese One sheet 8 1/2 x 11 One sheet 8 1/2 x 11 IKI solution in 100 ml bottles for students Use extra hot water One per team of 4 One per team of 4  One pair per team of 4 One per team of 4

# PLANNING GUIDE



BSCS

Some activities (*indicated in italics and an arrow in the margin*) must be prepared several days or weeks in advance. Use this summary as a teaching and preparation schedule. All supplies needed are listed.


List of Supplies Needed		Notes and Suggestions to Teacher ( <i>Italics and Arrow Indicate Advance Preparation Directions</i> )
per	Materials in Supply Kit	
per	<p>Chart</p> <p>Camera (Polaroid Square Shooter)</p> <p>Slide 3-37</p> <p>Slide 3-38</p> <p>Slide 3-39</p> <p>Slide 3-40</p>	<p>One box <i>Enough to make one 3" X 5" piece per student</i> <i>"The Living Plant"</i></p> <p>Plant Entering Restaurant</p> <p>Plant At Supermarket</p> <p>Plant Eating At Table</p> <p>Willow Tree in Tub Experiment</p> <p><i>Note: Step 2 of Teacher Preparation section must be taken care of now to insure success in later activities</i></p>
per per	<p>Starch test solution</p> <p>Hot plate</p> <p>1000 ml Beaker</p> <p>250 ml Beaker</p> <p>70% Alcohol</p> <p>Forceps</p> <p>Petri dish</p> <p>Camera (Polaroid Square Shooter)</p>	<p><i>These should have been growing now for several weeks from Activity 3-1.</i></p> <p>One box</p> <p><i>Examples including: raw potato, crackers, bread, bean seeds, cottage cheese, raw meat, etc.</i></p> <p>One sheet 8 1/2" X 11"</p> <p>One sheet 8 1/2" X 11"</p> <p><i>IKI solution in Barnes dropping bottles, one per team of four students</i></p> <p>Use extra hot plates or stove if available</p> <p>One per team of four students</p> <p>One per team of four students</p> <p>One pair per team of four students</p> <p>One per team of two students</p>




## Me and my Environment

UNIT III  
CORE D

## PLANNING GUIDE

NOTE: Some activities (indicated in *italics* and an  in the margin) be prepared several days or weeks in advance. Use this as a teaching and preparation schedule. All supplies need

Activity Number, Page, Tentative Teaching Date	Check List of Supplies Needed		(Italics and  in the margin)
	Materials You Furnish	Materials in Supply Kit	
3-22. Sun Spots  Page _____ Date planned _____	Bean plants with leaves partially covered	Camera (Polaroid Square Shooter) Hot plate Starch test solution  1000 ml Beaker 250 ml Beaker 70% Alcohol Forceps Petri dish Radiometer Chart	Started in Acid  Use extra hot IKI solution in <i>students</i> One per team of One per team of  One pair per team One per team of One "The Living Plant"
3-23. Plants Have An Air About Them  Page _____ Date planned _____	Bean plants Saran Wrap String Paper Tags	Chart Hot plate 1000 ml Beaker 250 ml Beaker 70% Alcohol Starch test solution  Forceps Petri dish Camera (Polaroid Square Shooter)	Previously started One roll Several feet Class supply For marking leaves "The Living Plant" Use additional One per team of One per team of  IKI solution in <i>students</i> One per team of One per team of

## PLANNING GUIDE



BSCS

Some activities (indicated in italics and an arrow in the margin) must be prepared several days or weeks in advance. Use this summary as a teaching and preparation schedule. All supplies needed are listed.


List of Supplies Needed	Notes and Suggestions to Teacher (Italics and Arrow Indicate Advance Preparation Directions)
<p>Materials in Supply Kit</p> <p>Camera (Polaroid Square Shooter) Hot plate Starch test solution</p> <p>1000 ml Beaker 250 ml Beaker 70% Alcohol Forceps Petri dish Radiometer Chart</p>	<p>Started in Activity 3-20 and left in sun for several days</p> <p>Use extra hot plates or stove if available <i>IKI solution in Barnes dropping bottles, one per team of four students</i> One per team of four students One per team of four students</p> <p>One pair per team of four students One per team of two students One "The Living Plant"</p>
<p>Chart Hot plate 1000 ml Beaker 250 ml Beaker 70% Alcohol Starch test solution</p> <p>Forceps Petri dish Camera (Polaroid Square Shooter)</p>	<p>Previously started in Activity 3-1 One roll Several feet Class supply For marking leaves "The Living Plant" Use additional hot plates or stove if available One per team of four students One per team of four students</p> <p><i>IKI solution in Barnes dropping bottles, one per team of four students</i> One per team of four students One per team of two students</p>



## Me and my Environment

UNIT III  
CORE D


## PLANNING GUIDE

NOTE: Some activities (indicated in italics and an  in the margin) should be prepared several days or weeks in advance. Use this guide to develop a teaching and preparation schedule. All supplies needed are listed in the table.

Activity Number, Page, Tentative Teaching Date	Check List of Supplies Needed		(Italics and arrows indicate items to be prepared in advance)
	Materials You Furnish	Materials in Supply Kit	
3-24. The Green Machine  Page _____ Date planned _____	Variegated (multi-colored) geranium or coleus plant  Variety of green plants  White paper	Chart Hot plate 1000 ml Beaker 250 ml Beaker 70% Alcohol Starch test solution  Forceps Petri dish	Secure from local sources for activity. If you cannot find them for your activity, you cannot keep them for display purposes. Class supply "The Living Planet" Use additional materials. One per team of four students. One per team of four students.
3-25. Review Of Success  Page _____ Date planned _____	35mm Slide projector	Worksheet 3-20 Slide 3-41 Slide 3-42	Review Of Success Review Of Success Review Of Success

## PLANNING GUIDE


**BSCS**

The activities (indicated in *italics* and an  in the margin) must be prepared several days or weeks in advance. Use this summary as a teaching and preparation schedule. All supplies needed are listed.

List of Supplies Needed		Notes and Suggestions to Teacher ( <i>Italics and Arrow Indicate Advance Preparation Directions</i> )
Activity	Materials in Supply Kit	
(ored) plant s	Chart Hot plate 1000 ml Beaker 250 ml Beaker 70% Alcohol Starch test solution  Forceps Petri dish	<p><i>Secure from local florist or garden center in advance of this activity. If they do not have them in stock, they can order them for you.</i></p> <p><i>For display purposes. You can borrow them just for the day if you cannot keep a lot of plants in your room.</i></p> <p>Class supply            "The Living Plant"            Use additional hot plates or stove if available            One per team of four students            One per team of four students</p> <p><i>IKI solution in Barnes dropping bottles, one per team of four students.</i>            One per team of four students            One per team of two students</p>
	Worksheet 3-20 Slide 3-41 Slide 3-42	Review Of Success Review Of Success Questions 1-10 Review Of Success Question 11





# Me and my Environment

## UNIT III CORE D

## PLANNING GUIDE


NOTE: Some activities (indicated in *italics* and an in the be prepared several days or weeks in advance. Use this a teaching and preparation schedule. All supplies need

Activity Number, Page, Tentative Teaching Date	Check List of Supplies Needed		<i>(Italics and leaf icon)</i>
	Materials You Furnish	Materials in Supply Kit	
3-20. Hungry Plants  Page _____ Date planned _____	35mm Slide projector Paper clips Black construction paper	Chart Camera (Polaroid Square Shooter) Slide 3-37 Slide 3-38 Slide 3-39 Slide 3-40	One box Enough to make The Living Pla  Plant Entering Plant At Super Plant Eating A Willow Tree in NOTE: Step 2 of now
3-21. Testing For Starch  Page _____ Date planned _____	Geranium plants  Cornstarch Food samples  Green construction paper Black construction paper	Starch test solution  Hot plate 1000 ml Beaker 250 ml Beaker 70% Alcohol Forceps Petri dish Camera (Polaroid Square Shooter)	These should h Activity 3-1 One box Examples inclu cottage chee One sheet 8 1/2 One sheet 8 1/2 IKI solution in students Use extra hot One per team o One per team o  One pair per t One per team o

## PLANNING GUIDE



**BSCS**

Some activities (indicated in italics and an  in the margin) must be prepared several days or weeks in advance. Use this summary as a teaching and preparation schedule. All supplies needed are listed.


List of Supplies Needed		Notes and Suggestions to Teacher (Italics and Arrow Indicate Advance Preparation Directions)
er	Chart Camera (Polaroid Square Shooter) Slide 3-37 Slide 3-38 Slide 3-39 Slide 3-40	One box Enough to make one 3" X 5" piece per student The Living Plant  Plant Entering Restaurant Plant At Supermarket Plant Eating At Table Willow Tree in Tub Experiment NOTE: Step 2 of Teacher Preparation section must be taken care of now to insure success in later activities
er er	Starch test solution  Hot plate 1000 ml Beaker 250 ml Beaker 70% Alcohol Forceps Petri dish Camera (Polaroid Square Shooter)	These should have been growing now for several weeks from Activity 3-1. One box Examples including: raw potato, crackers, bread, bean seeds, cottage cheese, raw meat, etc. One sheet 8 1/2" X 11" One sheet 8 1/2" X 11" IKI solution in Barnes dropping bottles, one per team of four students Use extra hot plates or stove if available One per team of four students One per team of four students  One pair per team of four students One per team of two students





## Me and my Environment

UNIT III  
CORE D

## PLANNING GUIDE


NOTE: Some activities (indicated in *italics* and an  in the margin) should be prepared several days or weeks in advance. Use this guide to develop a teaching and preparation schedule. All supplies needed are listed.



Activity Number, Page, Tentative Teaching Date	Check List of Supplies Needed		(Italics indicate materials to be prepared in advance)
	Materials You Furnish	Materials in Supply Kit	
3-22. Sun Spots  Page _____ Date planned _____	Bean plants with leaves partially covered	Camera (Polaroid Square Shooter) Hot plate Starch test solution  1000 ml Beaker 250 ml Beaker 70% Alcohol Forceps Petri dish Radiometer Chart	 Started in Act  Use extra hot IKI solution in students One per team of 4 One per team of 4  One pair per team of 4 One per team of 4 One The Living Planet
3-23. Plants Have An Air About Them  Page _____ Date planned _____	Bean plants Saran Wrap String Paper Tags	Chart Hot plate 1000 ml Beaker 250 ml Beaker 70% Alcohol Starch test solution  Forceps Petri dish Camera (Polaroid Square Shooter)	 Previously started One roll Several feet Class supply For marking leaves The Living Planet Use additional One per team of 4 One per team of 4  IKI solution in students One per team of 4 One per team of 4

## PLANNING GUIDE



**BSCS**

activities (indicated in italics and an  in the margin) must be prepared several days or weeks in advance. Use this summary as a planning and preparation schedule. All supplies needed are listed.

of Supplies Needed	Notes and Suggestions to Teacher (Italics and Arrow Indicate Advance Preparation Directions)
Materials in Supply Kit	
Camera (Polaroid Square Shooter) Hot plate Starch test solution  1000 ml Beaker 250 ml Beaker 70% Alcohol Forceps Petri dish Radiometer Chart	 <i>Started in Activity 3-20 and left in sun for several days</i>  Use extra hot plates or stove if available <i>IKI solution in Barnes dropping bottles, one per team of four students</i> One per team of four students One per team of four students  One pair per team of four students One per team of two students One The Living Plant
Chart Hot plate 1000 ml Beaker 250 ml Beaker 70% Alcohol Starch test solution  Forceps Petri dish Camera (Polaroid Square Shooter)	 <i>Previously started in Activity 3-1</i> One roll Several feet Class supply For marking leaves The Living Plant Use additional hot plates or stove if available One per team of four students One per team of four students  <i>IKI solution in Barnes dropping bottles, one per team of four students</i> One per team of four students One per team of two students



# Me and my Environment

UNIT III  
CORE D

## PLANNING GUIDE

NOTE: Some activities indicated in italics and an arrow in the margin be prepared several days or weeks in advance. Use this as a teaching and preparation schedule. All supplies needed

Activity Number, Page, Tentative Teaching Date	Check List of Supplies Needed		(Italics and arrows in the margin)
	Materials You Furnish	Materials in Supply Kit	
3-24. The Green Machine  Page _____ Date planned _____	Variegated (multi-colored) geranium or coleus plant  Variety of green plants  White paper	Chart Hot plate 1000 ml Beaker 250 ml Beaker 70% Alcohol Starch test solution  Forceps Petri dish	Secure from local activity. If you cannot find them for you. For display purposes you cannot keep them. Class supply The Living Plant Use additional h One per team of One per team of  IKI solution in students. One per team of One per team of
3-25. Review Of Success  Page _____ Date planned _____	35mm Slide projector	Worksheet 3-20 Slide 3-41 Slide 3-42	Review Of Success Review Of Success Review Of Success

## PLANNING GUIDE



**BSCS**

Some activities (indicated in italics and an arrow in the margin) must be prepared several days or weeks in advance. Use this summary as a teaching and preparation schedule. All supplies needed are listed.

List of Supplies Needed		Notes and Suggestions to Teacher (Italics and Arrow Indicate Advance Preparation Directions)
Activity	Materials in Supply Kit	
Plant	Chart Hot plate 1000 ml Beaker 250 ml Beaker 70% Alcohol Starch test solution Forceps Petri dish	<p>Secure from local florist or garden center in advance of this activity. If they do not have them in stock, they can order them for you.</p> <p>For display purposes. You can borrow them just for the day if you cannot keep a lot of plants in your room.</p> <p>Class supply</p> <p>The Living Plant</p> <p>Use additional hot plates or stove if available</p> <p>One per team of four students</p> <p>One per team of four students</p> <p>IKI solution in Barnes dropping bottles, one per team of four students.</p> <p>One per team of four students</p> <p>One per team of two students</p>
	Worksheet 3-20 Slide 3-41 Slide 3-42	Review Of Success Review Of Success Questions 1-10 Review Of Success Question 11



## Me and my Environment

### OBJECTIVE FOCUS FOR THIS ACTIVITY

#### UNIT GOALS:

1. Realize and appreciate the energy inter-relationships between organisms.
2. Appreciate and understand man's dependence on green plants for food.

#### CORE D OBJECTIVES:

1. Determine that plants contain food.
7. Appreciate the role of green plants in supplying food to the remainder of the living world.

### MATERIALS

Camera (Polaroid Square Shooter)  
 Polaroid color film  
 \*35mm Slide projector  
 The Living Plant Chart  
 \*3" X 5" Black construction paper  
   1 piece per student  
 \*Paper clips  
   Slides 3-37 through 3-40  
 \*Not furnished in materials kit

### TEACHING STRATEGIES

#### Activity 3-20. Hungry Plants

*This activity will concern itself with the following questions:*

1. *Do plants need food?*
2. *If so, where do they get it?*

#### Teacher Preparation:

1. Since these next activities deal with a step-by-step process to develop the idea of photosynthesis, please read over this core before proceeding so that you will guard against giving the students any information early in the core that they will be discovering for themselves later.

FOCUS FOR THIS ACTIVITY

## GOALS:

- Realize and appreciate the energy inter-relationships between organisms.
- Appreciate and understand man's dependence on green plants for food.

## OBJECTIVES:

- Determine that plants contain food.
- Appreciate the role of green plants in supplying food to the remainder of the living world.

## UNIT III.

ENERGY RELATIONSHIPS  
IN MY ENVIRONMENT

## CORE D.

## FOOD MAKING IN PLANTS

**BSCS**

## ACTIVITY 3-20. HUNGRY PLANTS

**TEACHING STRATEGIES**20. Hungry Plants

Activity will concern itself with the following

plants need food?

so, where do they get it?

Preparation:

These next activities deal with a step-by-step process to develop the idea of photosynthesis, read over this core before proceeding so that all guard against giving the students any information early in the core that they will be covering for themselves later.

**ANTICIPATED STUDENT BEHAVIORS**

At the end of this activity, each student should:

- have stated that plants need food to grow.
- have discussed Slides 3-37, 3-38, 3-39, and 3-40.
- have said that water does not provide energy and is not a food.
- have made a guess about where plants get their food.



# ACTIVITY 3-20

## MATERIALS

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## TEACHING STRATEGIES

2. To have plants ready for Activity 3-21, you must prepare them now.

Use the bean plants grown by the students. Plants to be tested should be placed in the dark and watered three days before this activity begins. This is to make sure the starch already present in the leaves is used up. The experiment can be done with plants that have not been kept in the dark, but the results are not so pronounced.

Begin by saying:

TODAY WE ARE GOING TO START AN EXPERIMENT WITH PLANTS. IT WILL TAKE THREE DAYS, AND WE WILL NEED TO LEARN MORE ABOUT PLANTS BEFORE WE CAN FINISH THE EXPERIMENT. I'LL EXPLAIN WHAT WE WILL DO TODAY TO BEGIN THE EXPERIMENT, AND YOU CAN MAKE SOME PREDICTIONS ABOUT WHAT WE ARE INVESTIGATING. HERE IS YOUR FIRST CLUE: THE PLANTS WE WILL USE HAVE BEEN KEPT IN THE DARK FOR THREE DAYS. WHAT DO YOU THINK WE WANT TO FIND OUT ABOUT PLANTS?

Record their answers on a corner of the board or on a poster to refer to in Activity 3-22. Then say:

HERE IS YOUR NEXT CLUE. WE ARE GOING TO CUT A LITTLE DESIGN IN A PIECE OF PAPER. THEN WE WILL COVER ONE OF THE LEAVES WITH THE PAPER EXCEPT WHERE THE OPEN DESIGN ALLOWS PART OF THE LEAF TO SHOW THROUGH. WHAT DO YOU THINK WE MIGHT FIND OUT BY DOING THIS?

## TEACHING STRATEGIES

ve plants ready for Activity 3-21, you must  
re them now.

n plants grown by the students. Plants to be  
ld be placed in the dark and watered three  
this activity begins. This is to make sure  
already present in the leaves is used up.  
ent can be done with plants that have not been  
dark, but the results are not so pronounced.

ying:

WE ARE GOING TO START AN EXPERIMENT WITH  
IT WILL TAKE THREE DAYS, AND WE WILL  
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answers on a corner of the board or on a  
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YOUR NEXT CLUE. WE ARE GOING TO CUT  
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OVER ONE OF THE LEAVES WITH THE PAPER  
WHERE THE OPEN DESIGN ALLOWS PART OF THE  
SHOW THROUGH. WHAT DO YOU THINK WE MIGHT  
T BY DOING THIS?

## ANTICIPATED STUDENT BEHAVIORS

Students:

--respond, "Do they need light," "What happens to  
plants in the dark?"

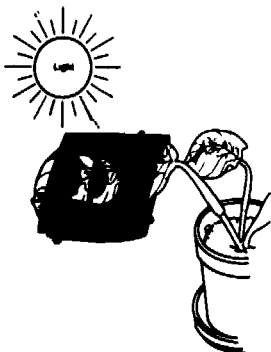
--respond, "What light and dark do to the leaves,"  
"What happens when only a part of a plant is in  
the light."



DISTRIBUTE MATERIALS

## MATERIALS

Diagram 3-14



## TEACHING STRATEGIES

- Distribute a 3" X 5" piece of black construction paper to each student.
- Have students fold the paper in half the short way (2 1/2" X 3").
- Have students cut a design in one-half of the paper with a pair of scissors. This design could be a circle, star, square, initial, etc. (See Diagram 3-14.)
- Each student then places the black paper over one of the leaves of a bean plant so the leaf is sandwiched between the two pieces of paper. Using paper clips, student fastens the paper to the leaf so that a minimum amount of light shines under the edges. The design should be on the side of the leaf that is most exposed to light. (See Diagram 3-14.)
- Place plants in direct sunlight or under a lamp for three days, or until Activity 3-21.

Select two or three students to take pictures of this set-up for their experiment. (It would be desirable for all students to make a photographic record of this experiment if the film supply will permit.) Have students label the pictures and store them for use at the end of the experiment.



The plants are being prepared in advance so the covered leaves will grow at least three days before being tested.

NOTE: This experiment is continued in Activity 3-22.

## TEACHING STRATEGIES

Provide a 3" X 5" piece of black construction paper to each student.

Students fold the paper in half the short way (3" X 3").

Students cut a design in one-half of the paper with a pair of scissors. This design could be a heart, star, square, initial, etc. (See Diagram 3-14.)

Each student then places the black paper over one of the leaves of a bean plant so the leaf is sandwiched between the two pieces of paper. Using paper clips, the student fastens the paper to the leaf so that a small amount of light shines under the edges. The student should be on the side of the leaf that is most exposed to light. (See Diagram 3-14.)

Place the plants in direct sunlight or under a lamp for three days, or until Activity 3-21.

Have three students take pictures of this set-up for the experiment. (It would be desirable for all three to make a photographic record of this experiment if the supply will permit.) Have students label the pictures and store them for use at the end of the experiment.



## CAMERA TIME

The plants should be prepared in advance so the covered leaves have grown at least three days before being tested.

The experiment is continued in Activity 3-22.

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-20

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ACTIVITY 3-20

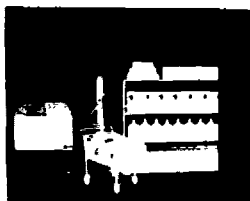
180

MATERIALS

Slide 3-37



Slide 3-38



TEACHING STRATEGIES

Then continue by saying:

DURING THE PAST FEW DAYS WE HAVE STUDIED SOME OF THE THINGS THAT ANIMALS EAT. WE HAVE TRACED AND BUILT MANY FOOD CHAINS. WHAT DID WE FIND AT THE END OF THESE FOOD CHAINS?

DO PLANTS GROW?

WHAT DO PLANTS NEED IN ORDER TO GROW?

Project Slide 3-37 and say:

WHAT DO YOU SEE IN THIS PICTURE?

COULD A PLANT GET ITS FOOD THIS WAY?

Project Slide 3-38 and say:

WHAT DO YOU SEE IN THIS PICTURE?

COULD A PLANT GET ITS FOOD THIS WAY?



DON'T ASK LEADING  
QUESTIONS



## TEACHING STRATEGIES

## ANTICIPATED STUDENT BEHAVIORS

Students:



WORK  
TIME

he by saying:

THE PAST FEW DAYS WE HAVE STUDIED SOME OF  
INGS THAT ANIMALS EAT. WE HAVE TRACED AND  
MANY FOOD CHAINS. WHAT DID WE FIND AT THE  
THESE FOOD CHAINS?

TS GROW?

PLANTS NEED IN ORDER TO GROW?

e 3-37 and say:

YOU SEE IN THIS PICTURE?

PLANT GET ITS FOOD THIS WAY?

--recall and respond, "Plants."

--respond, "Yes."

--respond, "Food."

--describe a plant going to a restaurant.

--respond, "No, plants can't go anywhere," "Plants  
can't eat in a restaurant."



DON'T ASK LEADING  
QUESTIONS

e 3-38 and say:

YOU SEE IN THIS PICTURE?

PLANT GET ITS FOOD THIS WAY?

--describe a plant shopping in a supermarket.

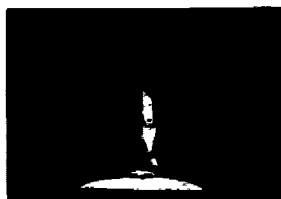
--respond, "No."



HAVE YOU  
INVOLVED  
ALL  
STUDENTS?

## MATERIALS

Slide 3-39



Slide 3-40



## TEACHING STRATEGIES

Project Slide 3-39 and say:

WHAT DO YOU SEE IN THIS PICTURE?

COULD A PLANT GET ITS FOOD THIS WAY?

HOW DO YOU SUPPOSE PLANTS GET THE FOOD  
THEY NEED IN ORDER TO GROW?

INVOLVE YOUR  
SLOWEST  
& STUDENTS

Accept and discuss all student responses, but do not  
interject ideas about whether the responses are right or  
wrong.

Then say:

A SCIENTIST WANTED TO FIND OUT WHERE A PLANT GOT  
THE FOOD THAT IT NEEDED TO GROW. HE PLANTED A  
SMALL TREE IN A TUB OF SOIL. HE CAREFULLY WEIGHED  
THE SOIL AND THE PLANT. HE THEN CAREFULLY COVERED  
THE SOIL SO THAT NOTHING ELSE COULD GET IN EXCEPT  
THE WATER THAT HE ADDED. HE SET THE PLANT OUTSIDE,  
WATERED IT ONLY WITH PURE WATER, AND WATCHED IT GROW  
FOR FIVE YEARS.

Project Slide 3-40 and say:

HOW MUCH DID THE TREE WEIGH WHEN IT WAS PLANTED?

HOW MUCH DID THE TREE WEIGH AFTER FIVE YEARS?

DID THE TREE NEED FOOD IN ORDER TO GROW THAT  
MUCH?

## TEACHING STRATEGIES

Slide 3-39 and say:

"DO YOU SEE IN THIS PICTURE?

"CAN A PLANT GET ITS FOOD THIS WAY?

"DO YOU SUPPOSE PLANTS GET THE FOOD  
THEY NEED IN ORDER TO GROW?"

Discuss all student responses, but do not  
debate about whether the responses are right or

"A SCIENTIST WANTED TO FIND OUT WHERE A PLANT GOT  
THE FOOD THAT IT NEEDED TO GROW. HE PLANTED A  
TREE IN A TUB OF SOIL. HE CAREFULLY WEIGHED  
THE TUB AND THE PLANT. HE THEN CAREFULLY COVERED  
THE TUB SO THAT NOTHING ELSE COULD GET IN EXCEPT  
THE WATER THAT HE ADDED. HE SET THE PLANT OUTSIDE,  
AND WATERED IT ONLY WITH PURE WATER, AND WATCHED IT GROW  
FOR FIVE YEARS.

Slide 3-40 and say:

"WHAT DID THE TREE WEIGH WHEN IT WAS PLANTED?

"WHAT DID THE TREE WEIGH AFTER FIVE YEARS?

"DO TREES NEED FOOD IN ORDER TO GROW THAT

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-20

181

Students:

--describe a plant sitting at a table eating.

--respond, "No."

--guess, "They eat dirt," "Don't know," "From  
water," etc.

INVOLVE YOUR  
SLOWEST  
STUDENTS

--study the slide and reply, "5 pounds."

--study the slide and reply, "169 pounds."

--respond, "Yes."



ACTIVITY 3-20

182

**MATERIALS**

**TEACHING STRATEGIES**

WHERE DID ITS FOOD COME FROM?

HOW MUCH DID THE SOIL WEIGH WHEN THE TREE WAS PLANTED?

HOW MUCH DID THE SOIL WEIGH AFTER FIVE YEARS?

DID THE PLANT EAT THE SOIL?

If students do not respond with a "no" answer for the above question, ask:

IF PLANTS DID EAT THE SOIL, MORE SOIL WOULD HAVE TO BE ADDED TO THE POT BECAUSE THE PLANTS WOULD USE UP THE SOIL. DID THE SCIENTISTS KEEP ADDING MORE SOIL TO THE POT?

IF NO EXTRA SOIL WAS ADDED, COULD THE PLANT HAVE EATEN ANY?

IF THE PLANT DIDN'T USE ANY SOIL, THEN WHERE DO YOU THINK THE PLANT GOT ITS FOOD?

As a further explanation to the students, say:

PLANTS DO NOT EAT SOIL FOR FOOD. THE SOIL HOLDS THE PLANTS DOWN AND PREVENTS THEM FROM BEING BLOWN AWAY. IT ALSO HOLDS THE WATER WHICH PLANTS TAKE IN THROUGH THEIR ROOTS.

DO PLANTS NEED WATER?

COULD THE WILLOW TREE HAVE GROWN 164 POUNDS FROM THE WATER THAT THE SCIENTIST ADDED?

Turn off the projector and say:

## TEACHING STRATEGIES

DID ITS FOOD COME FROM?

MUCH DID THE SOIL WEIGH WHEN THE TREE WAS  
ED?

MUCH DID THE SOIL WEIGH AFTER FIVE YEARS?

HE PLANT EAT THE SOIL?

If students do not respond with a "no" answer  
for the above question, ask:

IF PLANTS DID EAT THE SOIL, MORE SOIL WOULD  
HAVE TO BE ADDED TO THE POT BECAUSE THE PLANTS  
WOULD USE UP THE SOIL. DID THE SCIENTISTS  
KEEP ADDING MORE SOIL TO THE POT?

IF NO EXTRA SOIL WAS ADDED, COULD THE PLANT  
HAVE EATEN ANY?

IF THE PLANT DIDN'T USE ANY SOIL, THEN WHERE  
DO YOU THINK THE PLANT GOT ITS FOOD?

er explanation to the students, say:

S DO NOT EAT SOIL FOR FOOD. THE SOIL  
THE PLANTS DOWN AND PREVENTS THEM FROM  
BLOWN AWAY. IT ALSO HOLDS THE WATER  
PLANTS TAKE IN THROUGH THEIR ROOTS.

ANTS NEED WATER?

THE WILLOW TREE HAVE GROWN 164 POUNDS  
THE WATER THAT THE SCIENTIST ADDED?

he projector and say:

## ANTICIPATED STUDENT BEHAVIORS

Students:

--suggest that it came from the water or from the  
dirt, though responses may vary.

--respond, "200 pounds."

--respond, "It still was the same, 200 pounds."

--infer that it did not since the soil did not  
weigh less.

--recall, "No."

--infer, "No."

--respond, "Don't know," "From the water."

--respond that plants need water.

--respond, "Yes," "Must have," "It didn't  
eat the dirt."

## MATERIALS

## TEACHING STRATEGIES

WHAT WAS THE ONLY THING THAT THE SCIENTISTS  
GAVE THE PLANT EVERY DAY?

IS WATER FOOD?

WHAT DO WE NEED FOOD FOR?

DOES WATER GIVE US ENERGY?

COULD YOU LIVE JUST BY DRINKING WATER, AND NOT  
EATING ANYTHING?

THEN DO YOU GET ANY ENERGY FROM WATER?

Then say:

WATER IS NOT A FOOD. IT HAS NO ENERGY IN IT.  
LIVING THINGS DO NEED WATER, BUT NOT FOR FOOD.

Continue by saying:

IF WATER ISN'T A FOOD FOR US, IS IT A FOOD FOR  
OTHER ANIMALS?

IS WATER FOOD FOR PLANTS?

IS AIR A FOOD? FOR ANIMALS? FOR PLANTS?

IS LIGHT A FOOD? FOR ANIMALS? FOR PLANTS?

ACCEPT  
ANSWER

## TEACHING STRATEGIES

WAS THE ONLY THING THAT THE SCIENTISTS  
THE PLANT EVERY DAY?

TER FOOD?

DO WE NEED FOOD FOR?

WATER GIVE US ENERGY?

YOU LIVE JUST BY DRINKING WATER, AND NOT  
ANYTHING?

DO YOU GET ANY ENERGY FROM WATER?

IS NOT A FOOD. IT HAS NO ENERGY IN IT.  
THINGS DO NEED WATER, BUT NOT FOR FOOD.

saying:

ER ISN'T A FOOD FOR US, IS IT A FOOD FOR  
ANIMALS?

ER FOOD FOR PLANTS?

A FOOD? FOR ANIMALS? FOR PLANTS?

HT A FOOD? FOR ANIMALS? FOR PLANTS?

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-20

(183)

Students:

--recall, "Water."

--respond, "No," "Yes," "Could be," "Don't know."

--recall, "Energy."

--respond, "Yes," "No," "Maybe."

--respond, "No."


--infer that since water does not contain any  
energy, it must not be a food.

--respond, "No." "It doesn't have energy."

--respond, "Yes," "No," "Maybe," "I don't know."

--respond with various guesses.

--respond with various guesses.

  
**ACCEPT ALL  
ANSWERS**

ACTIVITY 3-20

MATERIALS

184

TEACHING STRATEGIES

ACCEPT A  
ANSWER

Now ask for a show of hands and record the number of students who think water, light, and/or air are foods.

If many students do not raise hands in response to the questions, continue with the statement below. If many students do raise their hands indicating they think air, water, and light are foods, spend additional time clarifying this concept of need versus food.

Then say:

SCIENTISTS AGREE THAT WATER, LIGHT, AND AIR ARE NOT FOODS. IF THEY ARE NOT, THEN WHERE DO PLANTS GET THEIR FOOD? FOR THE NEXT FEW DAYS THIS IS THE QUESTION WE WILL BE TRYING TO ANSWER.

DOES ANYONE HAVE ANY IDEA WHERE PLANTS GET THEIR FOOD?

GIVE STUDENT  
TIME  
TO  
THINK

ASK FOR  
OTHER IDEAS

## TEACHING STRATEGIES

## ANTICIPATED STUDENT BEHAVIORS

Students:

  
**ACCEPT ALL  
ANSWERS**

a show of hands and record the number of  
to think water, light, and/or air are foods.

Students do not raise hands in response to the  
continue with the statement below. If many  
raise their hands indicating they think air,  
light are foods, spend additional time clari-  
concept of need versus food.

STTS AGREE THAT WATER, LIGHT, AND AIR  
FOODS. IF THEY ARE NOT, THEN WHERE  
TS GET THEIR FOOD? FOR THE NEXT FEW  
IS IS THE QUESTION WE WILL BE TRYING  
ER.

YONE HAVE ANY IDEA WHERE PLANTS GET  
FOOD?

--speculate and provide a variety of guesses.

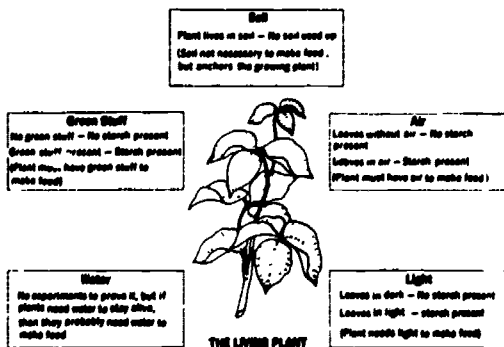
**GIVE STUDENTS  
TIME  
TO  
THINK**



**ASK FOR  
OTHER IDEAS**

## MATERIALS

Diagram 3-15



## TEACHING STRATEGIES

After allowing ample time for speculation and discussion, introduce The Living Plant Chart. (See Diagram 3-15.)

Display the chart and say:

HERE IS A CHART ABOUT PLANTS. WE WILL BE PUTTING INFORMATION ON THIS CHART AS WE COMPLETE THE NEXT FEW EXPERIMENTS. CAN ANYONE TELL ME WHAT HE SEES ON THE CHART?

THE RECTANGLES STAND FOR THE THINGS THAT WE THINK PLANTS NEED. WE WILL BE DOING SOME EXPERIMENTS TO FIND OUT FOR SURE IF PLANTS DO NEED EACH ONE OF THESE THINGS. WHEN WE FIND OUT SOME INFORMATION, WE'LL WRITE IT IN ONE OF THE RECTANGLES. WHICH RECTANGLE COULD WE FILL IN BASED ON WHAT WE HAVE LEARNED TODAY?

WHAT COULD WE WRITE IN THE SPACE TO TELL US WHAT SOIL HAS TO DO WITH PLANTS?

Have the class decide on a response similar to the one in Diagram 3-15. Appoint or select a volunteer to write in this information on the chart. Do the same for water. Keep the chart on display in the room for future use.

## TEACHING STRATEGIES

allowing ample time for speculation and discussion,  
The Living Plant Chart. (See Diagram 3-15.)

the chart and say:

"THIS IS A CHART ABOUT PLANTS. WE WILL BE  
GAINING INFORMATION ON THIS CHART AS WE  
COMPLETE THE NEXT FEW EXPERIMENTS. CAN  
YOU TELL ME WHAT HE SEES ON THE CHART?"

"RECTANGLES STAND FOR THE THINGS THAT WE  
PLANTS NEED. WE WILL BE DOING SOME  
EXPERIMENTS TO FIND OUT FOR SURE IF PLANTS  
NEED EACH ONE OF THESE THINGS. WHEN WE  
OBTAIN SOME INFORMATION, WE'LL WRITE IT  
IN ONE OF THE RECTANGLES. WHICH RECTANGLE  
DO WE FILL IN BASED ON WHAT WE HAVE  
OBTAINED TODAY?"

"COULD WE WRITE IN THE SPACE TO TELL US  
WHAT SOIL HAS TO DO WITH PLANTS?"

"The class decide on a response similar to the one in  
Diagram 3-15. Appoint or select a volunteer to write in  
information on the chart. Do the same for water.  
The chart on display in the room for future use.

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-20

185

Students:

--describe chart, mentioning the plant in the center  
and the air, light, water, green stuff, and soil  
rectangles around it.

--reply, "Soil," "Soil rectangle," "Water," "Water  
rectangle."

--suggest, "They didn't eat it because the soil  
didn't disappear," "They didn't use it for food,"  
"Plants grow in it."



UNIT III, CORE D  
ACTIVITY 3-20: "Hungry Plants"

Activity name suggested by class:

Teacher	
BSCS USE:	Post Tally Rev
Day 1	Day 2
Day 3	Day 4
Day 5	Day 6

1.	Date taught (month and date, e.g. 11/2)					
2.	Minutes of class time on science each day					
3.	Minutes of preparation each day					
4.	Students absent on each date (Use ID Number)					

5. Interest of class as expressed by apparent attention to what is happening.Number of students responding with: Name students you noted especially:  
(Number)

HIGH INTEREST	_____
MODERATE INTEREST	_____
INDIFFERENCE	_____
MODERATE RESISTANCE	_____
STRONG DISLIKE	_____
HARD TO RATE	_____

6. Equipment in kit: ☐ None ☐ Satisfactory ☐ Too fragile ☐ Too complicated to use ☐ Difficult to use
7. Equipment I got: ☐ None ☐ Easy to get but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:	Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: Omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:
10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:
11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:
12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?
13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:
14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:

- ☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless
- keep as is revision suggested major changes described --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

7. Equipment I got: ☐ None needed ☐ Easy to get but okay ☐ Hard to get, add to kit ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Other #
Worthwhile as is						
Revise slightly						
Revise much						
Worthless: omit						

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:
10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:
11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:
12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?
13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:
14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:
15. Your rating of this activity:  
☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless  
--keep as is rev: on suggested major changes described --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed.  
What parts of this activity should be retained when the curriculum is revised?  
Page(s) \_\_\_\_\_:

17. Did your students have difficulty thinking of the questions or problems suggested by the first two clues at the beginning of this activity?  
☐ No ☐ Yes: What did you do?

18. When you asked for a show of hands, how many students still thought water, light, or air were foods for animals or plants?  
☐ None ☐ 1/4 ☐ 1/2 ☐ 3/4 ☐ All: Comment.

19. Were any of your students able to answer the question, "Where do plants get their food?" by saying they make it?  
☐ No ☐ Yes: Comment.

20. Concern (or questions) about content:

21. Messages for staff (read immediately):

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

UNIT III, CORE D  
ACTIVITY 3-20: "Hungry Plants"

Teacher \_\_\_\_\_

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "tuned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.



## Me and my Environment

### OBJECTIVE FOCUS FOR THIS ACTIVITY

#### UNIT GOALS:

1. Realize and appreciate the energy inter-relationships between organisms.
2. Appreciate and understand man's dependence on green plants for food.

#### CORE D OBJECTIVES:

1. Determine that plants contain food.
2. Conclude that plants can make their own food when certain environmental conditions prevail.
7. Appreciate the role of green plants in supplying food to the remainder of the living world.

### MATERIALS

### TEACHING STRATEGIES

#### Activity 3-21. Testing For Starch

*Before recognizing that plants make their own food, students must first establish that food is present in plants. In this activity the students will learn that starch is a food and how to test for the presence of starch.*

**FOCUS FOR THIS ACTIVITY**

**GOALS:**

1. Realize and appreciate the energy inter-relationships between organisms.
2. Appreciate and understand man's dependence on green plants for food.

**D OBJECTIVES:**

1. Determine that plants contain food.
2. Conclude that plants can make their own food when certain environmental conditions prevail.
7. Appreciate the role of green plants in supplying food to the remainder of the living world.

**TEACHING STRATEGIES**

**-21. Testing For Starch**

Recognizing that plants make their own food, must first establish that food is present in this activity the students will learn that a food and how to test for the presence of

**UNIT III.**

**ENERGY RELATIONSHIPS  
IN MY ENVIRONMENT**

**CORE D.**

**FOOD MAKING IN PLANTS**



**BSCS**

**ACTIVITY 3-21. TESTING FOR STARCH**

**ANTICIPATED STUDENT BEHAVIORS**

At the end of this activity, each student should:

- have identified starch as a food.
- have placed starch test solution on corn starch and recognized that it provides a positive test for starch.
- have tested various foods for the presence of starch.
- have participated in extracting chlorophyll from a leaf and in testing the leaf for the presence of starch.

# ACTIVITY 3-21

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## MATERIALS

\*Geranium plants that have been growing for several weeks (bean plants may be substituted)  
 Starch test solution (IKI solution) in Barnes dropping bottles, 1 per team  
 \*Cornstarch  
 \*Several food samples, including raw potatoes, crackers, bread, bean seeds, cottage cheese, raw meat, apple  
 \*Green paper (8 1/2" X 11")  
 \*Black or purple paper (8 1/2" X 11")  
 1000 ml Pyrex beaker, 1 per team  
 250 ml Pyrex beaker, 1 per team  
 70% Alcohol  
 Pair tongs, 1 pper team  
 Petri dish, 1 per team  
 Camera (Polaroid Square Shooter)  
 Polaroid color film  
 Hot plate

\*Not furnished in materials kit

## TEACHING STRATEGIES

### Teacher Preparation:

1. Have available one or more geranium or bean plants so that there is at least one leaf for each student.
2. Fill dropping bottles with starch test solution (IKI solution) -- one bottle per team of three or four students.
3. Prepare foods to be tested by cutting them into small portions.
4. Cut out two paper leaves the same size and shape -- one green, one black or dark purple -- from the sheets of construction paper.

Begin the activity by encouraging students to recall that plants have energy; ask:

WHAT KIND OF LIVING THING DID WE ALWAYS FIND AT THE END OF FOOD CHAINS?

WHAT DO PLANTS GIVE TO ALL THE OTHER LIVING THINGS IN THE FOOD CHAIN?

WE HAVE LEARNED THAT PLANTS SUPPLY ANIMALS WITH FOOD ENERGY. IF ALL ANIMALS GET THEIR FOOD FROM PLANTS, THEN WHERE DO PLANTS GET THEIR FOOD?

Some students may already realize that plants make food; others will realize this much later. At no point in this activity should they be told this information!

DO PLANTS REALLY HAVE FOOD IN THEM? TODAY WE ARE GOING TO DO SOME TESTS TO SEE IF WE CAN SHOW THAT PLANTS DO CONTAIN FOOD.

## TEACHING STRATEGIES

### Preparation:

available one or more geranium or bean plants  
at there is at least one leaf for each student.

dropping bottles with starch test solution  
(solution) -- one bottle per team of three or  
students.

are foods to be tested by cutting them into  
portions.

ut two paper leaves the same size and shape --  
green, one black or dark purple -- from the  
s of construction paper.

ctivity by encouraging students to recall that  
energy; ask:

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ould they be told this information!

NTS REALLY HAVE FOOD IN THEM? TODAY WE ARE  
O DO SOME TESTS TO SEE IF WE CAN SHOW THAT  
DO CONTAIN FOOD.

## ANTICIPATED STUDENT BEHAVIORS

Students:

--recall, "Plants."

--recall, "Energy," "Food energy," "Food."

## MATERIALS

## TEACHING STRATEGIES

Hold up a box of cornstarch and say:

WHAT KIND OF FOOD IS THIS?

CORNSTARCH IS A FOOD YOU HAVE EATEN MANY TIMES BUT PROBABLY DIDN'T REALIZE IT BECAUSE YOU DON'T EAT IT RIGHT FROM THE BOX. YOUR MOTHER USES CORNSTARCH WHEN SHE MAKES SUCH THINGS AS GRAVY, PUDDINGS, AND SAUCES.

Divide the class into teams of two. Select a student to put a spoonful of starch in a petri dish for each team. Distribute the starch test solution.



Select two teams to photograph cornstarch in the petri dish before it is tested with IKI solution. Then select two teams to photograph cornstarch after it is tested with IKI solution. Label and put aside for use later in the experiment.



Then say:

THIS IS STARCH TEST SOLUTION. PUT A DROP OF IT ON YOUR STARCH AND TELL ME WHAT HAPPENS.



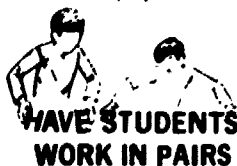
## TEACHING STRATEGIES

box of cornstarch and say:

KIND OF FOOD IS THIS?

STARCH IS A FOOD YOU HAVE EATEN MANY TIMES  
PROBABLY DIDN'T REALIZE IT BECAUSE YOU DON'T  
T RIGHT FROM THE BOX. YOUR MOTHER USES  
STARCH WHEN SHE MAKES SUCH THINGS AS GRAVY,  
INGS, AND SAUCES.

class into teams of two. Select a student to  
onful of starch in a petri dish for each team.  
the starch test solution.



teams to photograph cornstarch in the petri  
e it is tested with IKI solution. Then select  
to photograph cornstarch after it is tested  
solution. Label and put aside for use later in  
ment.



IS STARCH TEST SOLUTION. PUT A DROP  
ON YOUR STARCH AND TELL ME WHAT HAPPENS.

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-21

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Students:

--recognize or read from the box and reply,  
"Cornstarch."

--put a drop of IKI on the cornstarch and observe  
the color change; say, "It turned black," or  
"It turned dark purple."

ACTIVITY 3-21

190

**MATERIALS**

**TEACHING STRATEGIES**

Then ask:

WHAT COLOR WAS THE DROP OF STARCH TEST SOLUTION BEFORE YOU PUT IT ON YOUR STARCH?

HOW DID THE COLOR CHANGE WHEN YOU PUT IT ON THE STARCH?

WHAT SHOULD YOU LOOK FOR WHEN USING THE STARCH TEST SOLUTION TO FIND OUT IF SOMETHING HAS STARCH IN IT?

HOW COULD WE FIND OUT IF OTHER FOODS HAVE STARCH IN THEM?

Distribute the samples of other foodstuffs for the students to test. While they are completing the tests, list the foods on the board.

DISTRIBUTE MAT

WORK  
TIME

## TEACHING STRATEGIES

WHAT COLOR WAS THE DROP OF STARCH TEST SOLUTION  
YOU PUT IT ON YOUR STARCH?

WHAT DID THE COLOR CHANGE WHEN YOU PUT IT ON THE  
STARCH?

WHAT SHOULD YOU LOOK FOR WHEN USING THE STARCH  
TEST SOLUTION TO FIND OUT IF SOMETHING HAS STARCH?

WHAT SHOULD WE FIND OUT IF OTHER FOODS HAVE STARCH  
IN THEM?

WHAT SHOULD WE DO WITH THE SAMPLES OF OTHER FOODSTUFFS FOR THE  
STARCH TEST. WHILE THEY ARE COMPLETING THE TESTS,  
WHAT SHOULD WE DO WITH THE OTHER FOODS ON THE BOARD.

## ANTICIPATED STUDENT BEHAVIORS

Students:

--respond, "Brown," "Orange," etc.

--respond, "It turned black, dark purple," etc.

--infer that a positive test for starch is  
indicated by a change in color from orange-brown  
to purple-black when IKI is added.

--suggest putting the starch test solution on  
other foods.

--test additional foods for starch with starch  
test solution.



## MATERIALS

## TEACHING STRATEGIES

When the students have completed their tests, ask:

DID YOU FIND STARCH IN THE (name of the food)?

HOW DID YOU KNOW THAT (name of the food) HAS STARCH IN IT?

Tabulate the results of the student's tests on the chalkboard as you continue the questioning until a response for all foods tested has been obtained. Encourage each student to participate.



Then ask:

HOW CAN WE FIND OUT IF PLANTS HAVE STARCH IN THEM?

Distribute a fresh leaf (one that has been in sunlight) to each team and instruct them to test the leaf for starch.

Select two teams to photograph leaves before and two teams to photograph leaves after they are tested for the presence of starch. Label photos and set aside for use later on in the experiment. Although the photo will not reveal the presence of starch, this is an important step in the interpretation and should be recorded.

WHY DO WE WANT TO FIND OUT IF LEAVES HAVE STARCH IN THEM?

## TEACHING STRATEGIES

students have completed their tests, ask:

DO YOU FIND STARCH IN THE (name of the food)?

DID YOU KNOW THAT (name of the food) HAS STARCH IN IT?

Discuss the results of the student's tests on the chalk- you continue the questioning until a response for each tested has been obtained. Encourage each student to participate.



**HAVE YOU INVOLVED ALL STUDENTS?**

CAN WE FIND OUT IF PLANTS HAVE STARCH IN THEM?

Give each student a fresh leaf (one that has been in sunlight) to test and instruct them to test the leaf for starch.

Divide the class into teams to photograph leaves before and two teams to photograph leaves after they are tested for the presence of starch. Label photos and set aside for use later on in the experiment. Although the photo will not reveal the presence of starch, this is an important step in the experiment and should be recorded.

DO WE WANT TO FIND OUT IF LEAVES HAVE STARCH IN THEM?

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-21

191

Students:

--refer to the results of their tests and respond appropriately.

--respond, "It turned black."

--respond, "Put some of this solution on them."

--respond to the effect that since starch is something we eat for energy, maybe it is also what plants use for food.

ACTIVITY 3-21

192

**MATERIALS**

**TEACHING STRATEGIES**

If students are not aware of why they are to test leaves for starch, remind them that they are trying to find out if plants have food, and if so, what it might be.

WHAT HAPPENED WHEN YOU PUT THE SOLUTION ON THE LEAF?

DOES YOUR LEAF HAVE STARCH IN IT?

Hold up a sheet of green paper with a sheet of black or purple paper behind it, both previously cut in an identical shape of a leaf.

WHAT DO YOU SEE?

Now remove the green paper and ask:

NOW WHAT DO YOU SEE?

WHY COULDN'T YOU SEE THE PURPLE PAPER BEFORE?

IF THERE WAS STARCH IN THE LEAF, WHY DO YOU THINK THAT WE COULDN'T SEE IT WHEN WE ADDED THE STARCH TEST SOLUTION?

Discuss student responses to develop the idea that the green color of the leaf might hide the starch test color. Then ask:

WHAT COULD WE DO TO FIND OUT IF THERE REALLY IS STARCH IN THE LEAF?



WORK  
TIME

## TEACHING STRATEGIES

If students are not aware of why they are to test leaves for starch, remind them that they are trying to find out if plants have food, and if so, what it might be.

WHAT HAPPENED WHEN YOU PUT THE SOLUTION ON THE

YOUR LEAF HAVE STARCH IN IT?

Sheet of green paper with a sheet of black or  
purple behind it, both previously cut in an identical  
leaf.

WHAT DO YOU SEE?

Remove the green paper and ask:

WHAT DO YOU SEE?

COULDN'T YOU SEE THE PURPLE PAPER BEFORE?

IF THERE WAS STARCH IN THE LEAF, WHY DO YOU THINK  
YOU COULDN'T SEE IT WHEN WE ADDED THE STARCH  
SOLUTION?

Use student responses to develop the idea that the  
color of the leaf might hide the starch test color.

HOW CAN WE GO TO FIND OUT IF THERE REALLY IS  
STARCH IN THE LEAF?

## ANTICIPATED STUDENT BEHAVIORS

Students:

--respond, "Nothing," "It stayed the same."

--respond, "No."

--respond, "Green paper leaf."

--respond, "Purple paper leaf."

--respond, "The green paper was in the way," "It  
was behind the green paper."

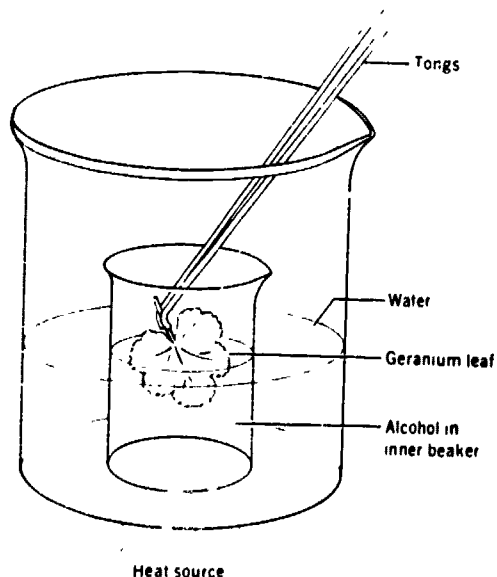
--respond, "The green color in the leaf could hide  
the starch."

--suggest that the green color would have to be  
removed.



## MATERIALS

Diagram 3-16



## TEACHING STRATEGIES

WE CAN GET RID OF THE GREEN COLOR BY BOILING THE LEAF IN ALCOHOL.

Organize the class into groups of two, three, or four students, depending upon number of hot plates available, and instruct students to carry out the following procedures:

**CAUTION:** Alcohol is highly flammable. Do not heat over an open flame. Use a water bath as pictured in Diagram 3-16. Do not have the water level too high because when the water boils it will splash out into the alcohol and flame. Avoid breathing the alcohol vapors.

1. Set up the water bath for heating alcohol and water. Bring the water to a low boil.
2. Remove a leaf from a plant and immerse it in boiling water for a minute or two.
3. Remove the leaf from the water with tongs and put it into the boiling alcohol. After several minutes the leaf should lose most of its color and appear grayish or yellowish white.
4. Submerge the leaf again in the boiling water for a few seconds. (This will make the leaf less brittle.)
5. Place the leaf flat in a petri dish and add just enough starch test solution to cover the leaf.
6. Allow the leaf to sit in the starch test solution for at least five minutes. Meanwhile, alert a team to photograph the results of the starch test on the leaf.

Then ask:



## TEACHING STRATEGIES

GET RID OF THE GREEN COLOR BY BOILING  
LEAF IN ALCOHOL.

Divide the class into groups of two, three, or four  
depending upon number of hot plates available,  
and let students to carry out the following

Alcohol is highly flammable. Do not heat over  
an open flame. Use a water bath as pictured in  
Diagram 3-16. Do not have the water level too  
high because when the water boils it will splash  
out into the alcohol and flame. Avoid breathing  
the alcohol vapors.

Place the water bath for heating alcohol and  
Bring the water to a low boil.

Take a leaf from a plant and immerse it in  
boiling water for a minute or two.

Remove the leaf from the water with tongs and  
place it into the boiling alcohol. After several  
minutes the leaf should lose most of its color  
and appear grayish or yellowish white.

Place the leaf again in the boiling water for  
30 seconds. (This will make the leaf less  
brittle.)

Place the leaf flat in a petri dish and add  
enough starch test solution to cover the leaf.

Let the leaf to sit in the starch test solution  
for at least five minutes. Meanwhile, alert a team  
to photograph the results of the starch test on the

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-21

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ACTIVITY 3-21

**MATERIALS**

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**TEACHING STRATEGIES**

WHAT HAPPENED WHEN YOU PUT STARCH TEST SOLUTION  
ON THE LEAF?

WHAT DOES IT MEAN?

WHAT HAVE WE DONE TO SHOW THAT PLANTS DO HAVE  
FOOD IN THEM?

Now select several students to arrange the photographs on  
the bulletin board (beginning with the cornstarch) showing  
the results of the starch testing process. Let them  
explain the process to the class.

The starch test solution can be poured off of the leaves  
and can be reused. This will cut down on the volume of  
test solution that you consume in this series of  
experiments.

## TEACHING STRATEGIES

HAPPENED WHEN YOU PUT STARCH TEST SOLUTION  
ON THE LEAF?

WHAT DOES IT MEAN?

WHAT HAVE WE DONE TO SHOW THAT PLANTS DO HAVE  
FOOD IN THEM?

Have several students to arrange the photographs on  
a board (beginning with the cornstarch) showing  
steps of the starch testing process. Let them  
present the process to the class.

The test solution can be poured off of the leaves  
and reused. This will cut down on the volume of  
solution that you consume in this series of

## ANTICIPATED STUDENT BEHAVIORS

Students:

--respond, "It turned black."

--interpret the color change, "Starch is present  
in the leaf," "Food is in the leaf."

--respond by describing the test for starch and  
removal of chlorophyll so the test can be seen.

UNIT III, CORE D  
ACTIVITY 3-21: "Testing For Starch"

Activity name suggested by class:

Teacher

BSCS USE: Post Tally Rev  
Day 1 Day 2 Day 3 Day 4 Day 5 Day 6

1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes of preparation each day						
4.	Students absent on each date (Use ID Number)						

5. Interest of class as expressed by apparent attention to what is happening.Number of students responding with: Name students you noted especially:  
(Number)

HIGH INTEREST	_____	_____	_____	_____
MODERATE INTEREST	_____	_____	_____	_____
INDIFFERENCE	_____	_____	_____	_____
MODERATE RESISTANCE	_____	_____	_____	_____
STRONG DISLIKE	_____	_____	_____	_____
HARD TO RATE	_____	_____	_____	_____

6. Equipment in kit: ☐ None ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use
7. Equipment I got: ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:	Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:
10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:
11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:
12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?
13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:
14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:
15. Your rating of this activity: ☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless  
--keep as is revision suggested major changes described --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

Equipment I got: ☐ None ☐ Easy ☐ Hard to get, ☐ Hard to get, ☐ Unobtainable,  
needed to get but okay add to kit add to kit

Materials used:	Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:  
10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:  
11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:  
12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?  
13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:  
14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:

☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless  
--keep as is revision suggested major changes described --drop it  
SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed.  
What parts of this activity should be retained when the curriculum is revised?  
Page(s) \_\_\_\_\_

17. List the foods that your students tested according to the results they got:  
Foods with starch:  
Foods without starch:

18. Did your students understand why they were testing for starch?  
☐ Yes ☐ No: Comment.

19. Did students have any difficulty removing the chlorophyll from the leaves?  
☐ Yes ☐ No

20. Were any difficulties encountered in taking any of the pictures in this activity?  
☐ No ☐ Yes: Comment.

21. Were students able to use the pictures to explain the experiment?  
☐ Yes ☐ No: Comment.

22. Concern (or questions) about content:

23. Messages for staff (read immediately):

BSCS Evaluation: EMH Feedback Form 1c

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

SIDE A

UNIT III, CORE D  
ACTIVITY 3-21: "Testing For Starch"

Teacher \_\_\_\_\_

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.



## Me and my Environment

### OBJECTIVE FOCUS FOR THIS ACTIVITY

#### UNIT GOALS:

1. Realize and appreciate the energy inter-relationships between organisms.
2. Appreciate and understand man's dependence on green plants for food.

#### CORE D OBJECTIVES:

1. Determine that plants contain food.
2. Conclude that plants can make their own food when certain environmental conditions prevail.
3. Infer that the sun provides the energy upon which man and other life depends.
4. Determine that in the absence of light, plants are unable to make food.
7. Appreciate the role of green plants in supplying food to the remainder of the living world.

### MATERIALS

### TEACHING STRATEGIES

#### Activity 3-22. Sun Spots

*This activity is designed to develop further the concept that plants make their own food. In the previous activity students tested a leaf for starch and concluded that*

FOCUS FOR THIS ACTIVITY

## GOALS:

1. Realize and appreciate the energy inter-relationships between organisms.
2. Appreciate and understand man's dependence on green plants for food.

## D OBJECTIVES:

1. Determine that plants contain food.
2. Conclude that plants can make their own food when certain environmental conditions prevail.
3. Infer that the sun provides the energy upon which man and other life depends.
4. Determine that in the absence of light, plants are unable to make food.
7. Appreciate the role of green plants in supplying food to the remainder of the living world.

**TEACHING STRATEGIES**-22. Sun Spots

Activity is designed to develop further the concept of plants making their own food. In the previous activity, students tested a leaf for starch and concluded that

## UNIT III.

ENERGY RELATIONSHIPS  
IN MY ENVIRONMENT

## CORE D.

## FOOD MAKING IN PLANTS

**BSCS**

## ACTIVITY 3-22. SUN SPOTS

**ANTICIPATED STUDENT BEHAVIORS**

At the end of this activity, each student should:

--have prepared a leaf by covering part of it with a paper filter.



# ACTIVITY 3-22

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## MATERIALS

Camera (Polaroid Square Shooter)  
Polaroid film

\*Bean plants set up during  
Activity 3-20 that have had  
part of a leaf covered and left  
in the sun for several days

Hot plates or stove for each  
student team

Starch test solution (IKI  
solution) in Barnes dropping  
bottles, one per student team

1000 ml Pyrex beaker, 1 per  
student team

250 ml Pyrex beaker, 1 per  
student team

70% Alcohol

12-Inch Tweezers or tongs, 1  
per student team

Petri dish, 1 per student team

Radiometer

The Living Plant Chart

\*Not furnished in materials kit

## TEACHING STRATEGIES

*plants have food present in them. This activity is the first of several that will examine the major requirements of the food-making process. The requirement for light will first be investigated as well as the role of the sun.*

### Teacher Preparation:

1. Refer to Activity 3-20, Core D for leaf preparation. Make certain that the leaves have been covered for at least three days.
2. Make sure The Living Plant Chart is hanging in view of the students.

A part of this activity will serve as a review of light energy, which was introduced in Activity 3-1, Core A.

Begin this activity by exhibiting the plants prepared earlier and say:

A FEW DAYS AGO WE COVERED SOME LEAVES WITH BLACK PAPER. WHY DID WE DO THIS?

DID THE PART OF THE LEAF UNDER THE PAPER GET ANY SUNLIGHT?

HOW COULD YOU FIND OUT IF THE LEAVES HAVE ANY STARCH IN THEM?

Instruct the students to remove the leaves carefully and to follow the directions and cautions given in Activity 3-20 in removing the black paper from the leaves and performing the starch test.

## TEACHING STRATEGIES

the food present in them. This activity is the several that will examine the major requirements and-making process. The requirement for light will be investigated as well as the role of the sun.

### Preparation:

Refer to Activity 3-20, Core D for leaf preparation. Be certain that the leaves have been covered for at least three days.

Be sure The Living Plant Chart is hanging in front of the students.

This activity will serve as a review of light which was introduced in Activity 3-1, Core A.

Begin the activity by exhibiting the plants prepared and say:

SEVERAL DAYS AGO WE COVERED SOME LEAVES WITH BLACK PAPER. WHY DID WE DO THIS?

DO THE PART OF THE LEAF UNDER THE PAPER GET ANY LIGHT?

COULD YOU FIND OUT IF THE LEAVES HAVE ANY STARCH IN THEM?

Have the students to remove the leaves carefully and to follow the directions and cautions given in Activity 3-20. Moving the black paper from the leaves and performing the starch test.

## ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

- have participated in a group that extracted the chlorophyll from a leaf and then tested the leaf for starch.
- have observed the radiometer demonstration.
- have recalled that there is energy in light.
- have concluded that plants get their energy to make food from the sun.

### Students:

--recall purpose of the experiment and state it in their own words.

--respond, "No," "Probably not."

--recall and describe test for starch.

## MATERIALS

## TEACHING STRATEGIES

Have students begin to take pictures that show which of several variables are needed to help the plant make its food. The first photo will show the effect of light on the leaf.

Select two students to photograph the leaf showing the pattern of the paper cutout. Label the picture and put it aside.

When the students have completed testing the leaves, ask:

WHAT HAPPENED WHEN YOU PUT THE STARCH TEST SOLUTION ON THE LEAVES?

The results will likely vary somewhat, for there may be some residual starch in the leaves. There should be, however, a striking difference between the part of the leaf that has been in the dark and the part in the light. The pattern the students cut out of the paper should be visible in the leaf as a result of the starch test. The part of the leaf covered should not respond to the starch test and remain white or gray. Discuss the results until the students agree that the part of the leaves which were in the dark have less starch in them than those in the light.

Now ask:

HOW CAN YOU EXPLAIN THE DIFFERENCE BETWEEN THE PART OF THE LEAF THAT WAS UNDER THE PAPER AND THE PART THAT WAS NOT UNDER THE PAPER?

WORK  
TIME

## TEACHING STRATEGIES

Students begin to take pictures that show which of the variables are needed to help the plant make its first photo will show the effect of light on

Students to photograph the leaf showing the the paper cutout. Label the picture and put it

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-22

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Students:



Students have completed testing the leaves, ask:

WHAT HAPPENED WHEN YOU PUT THE STARCH TEST PAPER ON THE LEAVES?

Students will likely vary somewhat, for there may be unequal starch in the leaves. There should be, however, a striking difference between the part of the leaf that has been in the dark and the part in the light. The part of the leaf cut out of the paper should be darker than the leaf as a result of the starch test. The part of the leaf covered should not respond to the starch test and remain white or gray. Discuss the results until the students agree that the part of the leaves which were in the dark have less starch in them than those in the light.

Can you explain the difference between the color of the leaf that was under the paper and the part that was not under the paper?

--observe the tested leaf and relate the results.

--respond with a variety of explanations; some students may suggest that the light must have been necessary for the starch to be there; others might suggest that the starch was used up for food or that the dark destroys starch.

ACTIVITY 3-22

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**MATERIALS**

**TEACHING STRATEGIES**

If students have suggested that the plant uses light to make food, skip the following sequence and begin the radiometer demonstration described later in this activity.

WHY DO WE EAT FOODS LIKE (list foods which you tested for starch), WHICH HAVE A LOT OF STARCH IN THEM?

Discuss the responses until students agree that we use those foods as a source of energy. Then ask:

WHY DO YOU THINK THAT PLANTS HAVE STARCH IN THEM?

To elicit the desired response you may have to ask additional questions, such as:

DO LIVING THINGS NEED ENERGY TO GROW?

DO PLANTS GROW?

ARE PLANTS ALIVE?

DO PLANTS NEED ENERGY? WHY?

DO FOODS WITH STARCH IN THEM HAVE ENERGY?

WHERE DO PLANTS GET ENERGY?

It is important that the next sequence be followed very closely to develop the logic necessary to make the inferences desired.

Place the radiometer in a strong source of light, preferably sunlight coming through a classroom window or sunlight out of doors. Instruct the students to observe the radiometer, then ask:

## TEACHING STRATEGIES

have suggested that the plant uses light to skip the following sequence and begin the demonstration described later in this activity.

WE EAT FOODS LIKE (list foods which you for starch), WHICH HAVE A LOT OF STARCH M?

responses until students agree that we use as a source of energy. Then ask:

YOU THINK THAT PLANTS HAVE STARCH IN THEM?

the desired response you may have to ask questions, such as:

ING THINGS NEED ENERGY TO GROW?

NTS GROW?

ANTS ALIVE?

NTS NEED ENERGY? WHY?

DS WITH STARCH IN THEM HAVE ENERGY?

DO PLANTS GET ENERGY?

stant that the next sequence be followed very develop the logic necessary to make the desired.

radiometer in a strong source of light, sunlight coming through a classroom window out of doors. Instruct the students to radiometer, then ask:

## ANTICIPATED STUDENT BEHAVIORS

Students:

--recall burning foods and infer that we eat starchy foods for energy.

--infer that plants can get energy from starch.

--respond, "Yes."

--respond, "Yes."

--respond, "Yes."

--infer that plants need energy to grow.

--respond, "Yes."

--respond, "From the starch," some students may respond that they get energy from the sun.

## MATERIALS

## TEACHING STRATEGIES

DOES ANYONE REMEMBER WHAT THIS IS CALLED?

Write the word "radiometer" on the chalkboard.

WHAT IS HAPPENING TO THE RADIOMETER?

ARE THE FLAGS IN THE RADIOMETER MOVING?

WHAT DOES IT TAKE TO CAUSE THINGS TO MOVE?

WHERE IS THE ENERGY COMING FROM?

IS THERE ENERGY IN SUNLIGHT?

HOW COULD WE FIND OUT IF ENERGY FROM SUNLIGHT  
IS MAKING THE RADIOMETER MOVE?

Allow a student to shade the radiometer and ask:

WHAT HAPPENED?

WHY?

IS THERE ENERGY IN LIGHT?

DO PLANTS NEED LIGHT TO GROW?

WHAT DO YOU THINK PLANTS GET FROM LIGHT?

IS THERE ENERGY IN STARCH?

DID THE PART OF THE LEAF THAT WAS IN THE DARK  
HAVE ANY STARCH IN IT?

WHY NOT?

## TEACHING STRATEGIES

ANYONE REMEMBER WHAT THIS IS CALLED?

word "radiometer" on the chalkboard.

IS HAPPENING TO THE RADIOMETER?

THE FLAGS IN THE RADIOMETER MOVING?

DOES IT TAKE TO CAUSE THINGS TO MOVE?

IS THE ENERGY COMING FROM?

WHERE ENERGY IN SUNLIGHT?

COULD WE FIND OUT IF ENERGY FROM SUNLIGHT MAKING THE RADIOMETER MOVE?

student to shade the radiometer and ask:

HAPPENED?

WHERE ENERGY IN LIGHT?

PLANTS NEED LIGHT TO GROW?

DO YOU THINK PLANTS GET FROM LIGHT?

WHERE ENERGY IN STARCH?

THE PART OF THE LEAF THAT WAS IN THE DARK ANY STARCH IN IT?

NOT?

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-22

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Students:

- recall first core of activities and respond, "Radiometer."
- describe the flags turning, spinning, indicate that it is moving.
- respond, "Yes."
- recall and respond, "Energy."
- recall, "From the light," "I don't know."
- respond, "Yes," "No," "Don't know."
- suggest shading the instrument.
- respond that the instrument stopped or that it went slower.
- infer that because it was shaded, it received no light energy.
- infer that there is energy in light.
- respond, "Yes."
- respond, "Maybe they get energy from light."
- respond, "Yes."
- respond, "No."
- infer that without light the leaf could not have starch.



ACTIVITY 3-22

MATERIALS

TEACHING STRATEGIES

200

WHAT MUST BE PRESENT FOR STARCH TO BE MADE?

WHAT DOES THE SUN GIVE OFF THAT IS USED BY THE PLANT TO MAKE STARCH?

THEN WHAT IS THERE IN BOTH STARCH AND SUNLIGHT?

WHAT IS ONE THING WE'VE FOUND OUT THAT PLANTS NEED IN ORDER TO MAKE THEIR FOOD?

At this time draw the students' attention to The Living Plant Chart and have them add the information just gained.

Say:

WHERE ON THIS CHART COULD WE RECORD THE INFORMATION WE'VE JUST LEARNED?

WHAT COULD WE WRITE IN THE RECTANGLE?

Appoint or select a volunteer to write this information on the chart in a form similar to that found in Diagram 3-15.

Conclude by asking:

DO YOU THINK PLANTS NEED ANYTHING BESIDES LIGHT TO MAKE FOOD?

## TEACHING STRATEGIES

ST BE PRESENT FOR STARCH TO BE MADE?

IS THE SUN GIVE OFF THAT IS USED BY THE  
O MAKE STARCH?

AT IS THERE IN BOTH STARCH AND SUNLIGHT?

ONE THING WE'VE FOUND OUT THAT PLANTS  
ORDER TO MAKE THEIR FOOD?

draw the students' attention to The Living  
and have them add the information just

THIS CHART COULD WE RECORD THE  
ION WE'VE JUST LEARNED?

LD WE WRITE IN THE RECTANGLE?

lect a volunteer to write this information  
in a form similar to that found in Diagram

asking:

HINK PLANTS NEED ANYTHING BESIDES LIGHT  
FOOD?

## ANTICIPATED STUDENT BEHAVIORS

Students:

--respond, "Light," "Sun."

--respond, "Energy," "Sunshine."

--respond, "Energy."

--respond, "Sun," "Light."

--suggest in the rectangle with the word light in the  
top.

--suggest, "There was only starch in the part of  
the leaf in the light," "No starch in the part of  
the leaf in the dark," "Starch can only be made  
when the leaf is in the sunlight."

--speculate and predict. (Do not encourage or  
reinforce any specific response.)

## MATERIALS

## TEACHING STRATEGIES

IN THE NEXT ACTIVITY WE'LL DO SOME MORE EXPERIMENTS  
TO FIND OUT.

DON'T ASK  
QUESTION

## TEACHING STRATEGIES

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-22

(201)

DON'T ASK LEADING  
QUESTIONS

THE NEXT ACTIVITY WE'LL DO SOME MORE EXPERIMENTS  
AND OUT.

UNIT III, CORE D  
ACTIVITY 3-22: "Sun Spots"

Activity name suggested by class:

Teacher	
BSCS USE:	Post Tally Rev
Day 1	Day 2
Day 3	Day 4
Day 5	Day 6

1.	Date taught (month and date, e.g. 11/2)					
2.	Minutes of class time on science each day					
3.	Minutes of preparation each day					
4.	Students absent on each date (Use ID Number)					

5. Interest of class as expressed by apparent attention to what is happening.Number of students responding with: Name students you noted especially:  
(Number)

HIGH INTEREST	_____
MODERATE INTEREST	_____
INDIFFERENCE	_____
MODERATE RESISTANCE	_____
STRONG DISLIKE	_____
HARD TO RATE	_____

6. Equipment in kit: ☐ None ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use7. Equipment I got: ☐ None ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:	Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:

☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless

--keep as is revision suggested major changes described ---drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

Equipment I got: ☐ None ☐ Easy ☐ Hard to get, ☐ Hard to get, ☐ Unobtainable,  
needed to get but okay add to kit add to kit

Materials used:	Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:
10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:
11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:
12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?
13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:
14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:
15. Your rating of this activity:  
☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless  
--keep as is revision suggested major changes described --drop it--  
SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed.  
What parts of this activity should be retained when the curriculum is revised?  
Page(s) \_\_\_\_\_:

17. Were your students able to state the purpose of the experiment started in Activity 3-20?  
☐ Yes ☐ No: What did you do?
18. Did students' leaves show a striking difference in the amount of starch present in areas exposed to light?  
☐ Yes ☐ No: Comment.
19. Were your students able to take pictures and use them to explain this experiment?  
☐ Yes ☐ No: Comment.
20. Concern (or questions) about content:
21. Messages for staff (read immediately):

BSCS Evaluation: EMH Feedback Form 1c

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

UNIT III, CORE D  
ACTIVITY 3-22: "Sun Spots"

Teacher \_\_\_\_\_

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.



## Me and my Environment

### OBJECTIVE FOCUS FOR THIS ACTIVITY

#### UNIT GOALS:

1. Realize and appreciate the energy inter-relationships between organisms.
2. Appreciate and understand man's dependence on green plants for food.

#### CORE D OBJECTIVES:

1. Determine that plants contain food.
2. Conclude that plants can make their own food when certain environmental conditions prevail.
5. Determine that without air, plants are unable to make food.
7. Appreciate the role of green plants in supplying food to the remainder of the living world.

### MATERIALS

### TEACHING STRATEGIES

#### Activity 3-23. Plants Have An Air About Them

*This activity will build on previous activities and establish another factor that plants need to make their food. While growing bean plants from seeds, students inferred that plants need water. In Activity 3-21 the students discovered that plants need light to make food. In this activity, it will be established that the food-making process in plants requires air.*



FOCUS FOR THIS ACTIVITY

## GOALS:

- Realize and appreciate the energy inter-relationships between organisms.
- Appreciate and understand man's dependence on green plants for food.

## OBJECTIVES:

- Determine that plants contain food.
- Conclude that plants can make their own food when certain environmental conditions prevail.
- Determine that without air, plants are unable to make food.
- Appreciate the role of green plants in supplying food to the remainder of the living world.

**TEACHING STRATEGIES****23. Plants Have An Air: About Them**

Activity will build on previous activities and another factor that plants need to make their growing bean plants from seeds, students at plants need water. In Activity 3-21 the discovered that plants need light to make food. Activity, it will be established that the food-ness in plants requires air.

## UNIT III.

ENERGY RELATIONSHIPS  
IN MY ENVIRONMENT

## CORE D.

## FOOD MAKING IN PLANTS

**BSCS**ACTIVITY 3-23. PLANTS HAVE AN AIR  
ABOUT THEM**ANTICIPATED STUDENT BEHAVIORS**

At the end of this activity, each student should:

- have covered a leaf on a growing plant to keep air from reaching the leaf.
- have tested covered and uncovered leaves for starch.
- have inferred that plants require air to manufacture starch.
- have reviewed The Living Plant Chart and recalled that plants need light and water to manufacture food.
- have participated in adding information to the plant chart.

# ACTIVITY 3-23

(204)

## MATERIALS

\*Bean plants (1 plant per team)  
 \*Saran Wrap (other paper will not work)  
 \*String  
 \*Paper  
 The Living Plant Chart  
 \*Tags for marking leaves  
 Hot plates  
 100 ~ 1 Pyrex beaker, 1 per team of students  
 250 ml Pyrex beaker, 1 per team of students  
 70% Alcohol  
 Starch test solution (IKI solution) in Barnes dropping bottles, 1 per student team  
 Pair of tongs, 1 per student team  
 Petri dish, 1 per student team  
 Camera (Polaroid Square Shooter)  
 Polaroid color film

\*Not furnished in materials kit

## TEACHING STRATEGIES

### Teacher Preparation:

1. Make certain The Living Plant Chart now has the light, soil, and water components filled in.
2. All leaves should remain on the plant until they are to be tested for starch.

Begin this activity by using the Plant Chart to summarize what students have discovered up to this point that plants need to manufacture food. The following points should be discussed.

1. Plants do not eat soil because the soil does not disappear as the plant grows.
2. Although no direct experiment was done to show that plants need water to make food, the need for water in the food-making process should be obvious since water is continually used by the plant and the plant dies without water.
3. Since the part of the leaves in the dark did not have starch present and the part of the leaves in the light did, plants therefore need sunlight to make food.

Begin this summarizing discussion by asking:

WHAT HAVE WE LEARNED SO FAR ABOUT WHAT PLANTS NEED TO MAKE THEIR FOOD?

## TEACHING STRATEGIES

ration:

ertain The Living Plant Chart now has the soil, and water components filled

ves should remain on the plant until they are tested for starch.

ctivity by using the Plant Chart to summarize have discovered up to this point that plants acture food. The following points should be

do not eat soil because the soil does not ar as the plant grows.

h no direct experiment was done to show that need water to make food, the need for water food-making process should be obvious since s continually used by the plant and the lies without water.

he part of the leaves in the dark did not arch present and the part of the leaves in ht did, plants therefore need sunlight to od.

mmarizing discussion by asking:

WE WE LEARNED SO FAR ABOUT WHAT PLANTS MAKE THEIR FOOD?

## ANTICIPATED STUDENT BEHAVIORS

Students:

--recall previous experiments and chart and include in the response those points listed above, i.e., 1, 2, and 3.

## MATERIALS

## TEACHING STRATEGIES

After the discussion, continue by asking:

DO PLANTS BREATHE?

DO YOU THINK PLANTS NEED AIR? WHY?

DO YOU THINK THAT A LEAF THAT DIDN'T HAVE  
ANY AIR WOULD HAVE STARCH IN IT?

HOW COULD WE FIND OUT?

HOW COULD WE KEEP A LEAF FROM GETTING AIR?

CAN YOU THINK OF A WAY THAT WE COULD KEEP AIR  
FROM REACHING SOME LEAVES?

Allow each student to select a leaf on a bean plant and label it with his name on a tag. Then cover the leaf with the airtight covering, Saran Wrap, and loosely tie it around the "leaf stem." The leaf surface must be completely covered, top and bottom, with as little air as possible remaining between the Saran Wrap and leaf surface.

Select a student to photograph the plant showing the experimental set up. Label and set aside.

Do not remove the leaf from the plant.



WORK  
TIME

## TEACHING STRATEGIES

discussion, continue by asking:

PLANTS BREATHE?

DO YOU THINK PLANTS NEED AIR? WHY?

DO YOU THINK THAT A LEAF THAT DIDN'T HAVE  
AIR WOULD HAVE STARCH IN IT?

COULD WE FIND OUT?

COULD WE KEEP A LEAF FROM GETTING AIR?

DO YOU THINK OF A WAY THAT WE COULD KEEP AIR  
FROM REACHING SOME LEAVES?

Have student to select a leaf on a bean plant and  
write his name on a tag. Then cover the leaf with  
light covering, Saran Wrap, and loosely tie it  
at the "leaf stem." The leaf surface must be com-  
pletely covered, top and bottom, with as little air as  
possible remaining between the Saran Wrap and leaf surface.

Have student to photograph the plant showing the  
total set up. Label and set aside.

Remove the leaf from the plant.

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-23

205

Students:

--respond, "Yes," "No," "They must, they need air."

--suggest that they require oxygen like animals;  
maybe they require it to make food, maybe they  
require it in order to live.

--respond, "Yes," "No," "Don't know."

--suggest testing a plant for starch which didn't  
have any air available.

--suggest putting it in a bottle.

--suggest wrapping leaves in plastic or coating  
leaves with something.



ACTIVITY 3-23

MATERIALS

206

TEACHING STRATEGIES

Place the plants in light for two or three days, watering when necessary. Go on to the next activity while waiting. Then test the leaves for starch, using the strategy from Activity 3-21. Be sure also to test some leaves that were not covered with Saran Wrap as a comparison. Just prior to testing the leaves, review with the students what was done two or three days earlier in preparing the plants for the test.

Select a student to photograph leaves immediately after they receive the starch test. Label and set aside for later use. This photo will show the test for the air variable.

Then ask:

DO PLANTS NEED AIR TO MAKE FOOD?



## TEACHING STRATEGIES

plants in light for two or three days, watering  
y. Go on to the next activity while waiting.  
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. Be sure also to test some leaves that were  
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three days earlier in preparing the plants



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the starch test. Label and set aside for  
his photo will show the test for the air



NEED AIR TO MAKE FOOD?

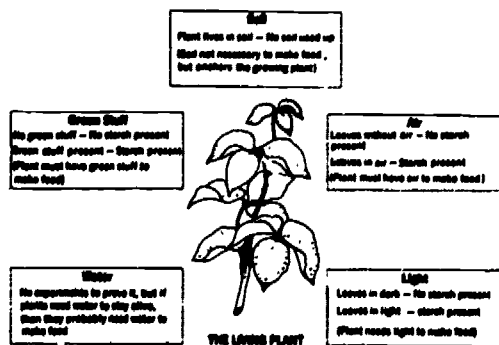
## ANTICIPATED STUDENT BEHAVIORS

Students:

--infer that plants need air since little starch  
was found in covered leaves.

## MATERIALS

Diagram 3-15



## TEACHING STRATEGIES

WOULD PLANTS BE MAKING ANY FOOD IF THEY DIDN'T HAVE AIR?

WOULD PLANTS BE ABLE TO LIVE WITHOUT AIR?

To conclude this activity, complete the section of The Living Plant Chart which pertains to air, emphasizing that since there was little starch in the covered leaf, plants need air for the food-making process. See Diagram 3-15 of the completed chart for suggested wording.



### TEACHING STRATEGIES

PLANTS BE MAKING ANY FOOD IF THEY DIDN'T  
AIR?

PLANTS BE ABLE TO LIVE WITHOUT AIR?

this activity, complete the section of The  
Chart which pertains to air, emphasizing  
there was little starch in the covered leaf,  
air for the food-making process. See Diagram  
completed chart for suggested wording.

### ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-23

Students:

--reply, "No," "Don't think so."

--reply, "No."

207

UNIT III, CORE D  
ACTIVITY 3-23: "Plants Have An Air About Them"

Activity name suggested by class:

Teacher

BSCS USE:	Post	Tally	Rev		
Day 1	Day 2	Day 3	Day 4	Day 5	Day 6

1.	Date taught (month and date, e.g. 11/2)								
2.	Minutes of class time on science each day								
3.	Minutes of preparation each day								
4.	Students absent on each date (Use ID Number)								

5. Interest of class as expressed by apparent attention to what is happening.Number of students responding with: Name students you noted especially:  
(Number)

HIGH INTEREST									
MODERATE INTEREST									
INDIFFERENCE									
MODERATE RESISTANCE									
STRONG DISLIKE									
HARD TO RATE									

6. Equipment in kit: ☐ None ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use7. Equipment I got: ☐ None ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

Materials used:	Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:

☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless

-----keep as is-----revision suggested-----major changes described-----drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

Equipment in kit: ☐ None ☐ Satisfactory ☐ Too fragile complicated to use ☐ Too difficult

Equipment I got: ☐ None ☐ Easy ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:

	Worksheet #	Game #	Slides (show slide nos.) #	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:
10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:
11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:
12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?
13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:
14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:
15. Your rating of this activity:  
☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless  
--keep as is revision suggested major changes described --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed.  
What parts of this activity should be retained when the curriculum is revised?  
Page(s) \_\_\_\_\_:

17. Were students confused or uncertain about why they were doing the experiment after the three-day wait? ☐ No ☐ Yes: Comment.

18. Did any of the wrapped leaves show the presence of starch?  
☐ No ☐ Yes: What did you do?

19. Did students take pictures and use them to explain this experiment?  
☐ Yes ☐ No: Why not?

20. Concern (or questions) about content:

21. Messages for staff (read immediately):

BSCS Evaluation: EMH Feedback Form 1c

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

UNIT III, CORE D  
ACTIVITY 3-23: "Plants Have An Air About Them"

Teacher \_\_\_\_\_

## REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
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## THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
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- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

## THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.



## Me and my Environment

### OBJECTIVE FOCUS FOR THIS ACTIVITY

#### UNIT GOALS:

1. Realize and appreciate the energy inter-relationships between organisms.
2. Appreciate and understand man's dependence on green plants for food.

#### CORE D OBJECTIVES:

1. Determine that plants contain food.
2. Conclude that plants can make their own food when certain environmental conditions prevail.
6. Determine that in the absence of "green stuff" (chlorophyll), plants are unable to make food.
7. Appreciate the role of green plants in supplying food to the remainder of the living world.

### MATERIALS

### TEACHING STRATEGIES

#### Activity 3-24. The Green Machine

*This activity will provide the last component of the answer to the question "What do plants need to make food?" The students will see, through experimentation, that only those parts of the leaf that contain "green stuff" (chlorophyll) produce starch, and therefore conclude that chlorophyll is necessary for photosynthesis to be completed.*

**FOCUS FOR THIS ACTIVITY****GOALS:**

1. Realize and appreciate the energy inter-relationships between organisms.
2. Appreciate and understand man's dependence on green plants for food.

**D OBJECTIVES:**

1. Determine that plants contain food.
2. Conclude that plants can make their own food when certain environmental conditions prevail.
6. Determine that in the absence of "green stuff" (chlorophyll), plants are unable to make food.
7. Appreciate the role of green plants in supplying food to the remainder of the living world.

**TEACHING STRATEGIES****3-24. The Green Machine**

Activity will provide the last component of the question "What do plants need to make food?" The students will see, through experimentation, that those parts of the leaf that contain "green stuff" (chlorophyll) produce starch, and therefore that chlorophyll is necessary for photosynthesis to be completed.

**UNIT III.****ENERGY RELATIONSHIPS  
IN MY ENVIRONMENT****CORE D.****FOOD MAKING IN PLANTS****BSCS****ACTIVITY 3-24. THE GREEN MACHINE****ANTICIPATED STUDENT BEHAVIORS**

*At the end of this activity, each student should:*

- have recalled the components of the food-making process explored thus far.
- have sketched a variegated leaf.
- have tested a variegated leaf for starch.
- have concluded that chlorophyll must be present in order for plants to produce food.

# ACTIVITY 3-24

210

## MATERIALS

- \*Variegated (multi-colored) geranium or coleus plant (most florists should have)
- \*Plain white paper
- The Living Plant Chart
- \*Many varieties of green plants for display use only
- Hot plates
- 1000 ml Pyrex beaker, 1 per team of students
- 250 ml Pyrex beaker, 1 per team of students
- 70% Alcohol
- Starch test solution (IKI solution) in Barnes dropping bottles, one per student team
- Pair of tongs, 1 per student team
- Petri dish, 1 per student team

\*Not furnished in materials kit

## TEACHING STRATEGIES

### Teacher Preparation:

1. Direct students to save the "green water" from the starch tests for use later in this activity.
2. A variegated geranium that shows a white leaf margin is a more reliable plant to use for the tests in this activity; a coleus plant may be used as a substitute, however, if the leaves have deep red centers and if it is a mature plant.

Begin by displaying The Living Plant Chart and asking:

WHAT HAVE WE BEEN TRYING TO FIND OUT THROUGH OUR LEAF EXPERIMENTS THE PAST WEEK?

Point to the chart and ask:

SO FAR, WHAT THINGS HAVE WE LEARNED PLANTS NEED TO MAKE FOOD?

The following points should be included in the discussion:

1. Plants do not eat soil because the soil does not disappear as the plant grows.
2. Although no direct experiment was done to show that plants need water to make food, since plants need water to grow they must need water to make food.

## TEACHING STRATEGIES

### Preparation:

ask students to save the "green water" from the tests for use later in this activity.

Designated geranium that shows a white leaf is a more reliable plant to use for the activity; a coleus plant may be a substitute, however, if the leaves have deep red centers and if it is a mature

Display The Living Plant Chart and asking:

WHAT HAVE WE BEEN TRYING TO FIND OUT THROUGH OUR EXPERIMENTS THE PAST WEEK?

Display chart and ask:

WHAT THINGS HAVE WE LEARNED PLANTS NEED TO MAKE FOOD?

Key points should be included in the discussion:

Plants do not eat soil because the soil does not move as the plant grows.

Although no direct experiment was done to show that plants need water to make food, since plants need water to grow they must need water to make

## ANTICIPATED STUDENT BEHAVIORS

Students:

--recall beginning of core and respond, "How plants make food," "Where plants get their food."

--examine and study The Living Plant Chart and recall light, air, and water.



## MATERIALS

## TEACHING STRATEGIES

3. Since leaves in the dark had no starch present when tested and leaves in the light did, plants therefore need sunlight to make food.
4. Since leaves covered with wrap showed little starch present and uncovered leaves clearly showed starch present, air must be necessary for the food-making process of plants.

Continue by showing the students various types of green plants. Say:

WHAT DO ALL THESE PLANTS HAVE IN COMMON?

ONE OF THE THINGS YOU MENTIONED THAT WAS THE SAME ABOUT ALL PLANTS IS THAT SOME PART OF EACH PLANT IS GREEN.

WHY DO YOU SUPPOSE PLANTS ARE GREEN?

WHAT DO WE CALL THIS "GREEN STUFF?"

Write "chlorophyll" on the board.

Discuss all responses. If students suggest that the chlorophyll has something to do with food, ask them how they might test that idea. If not, ask:

DO YOU SUPPOSE PLANTS COULD LIVE IF THEY WERE NOT GREEN?

DON'T ASK

QUESTION

## TEACHING STRATEGIES

leaves in the dark had no starch present  
tested and leaves in the light did, plants  
before need sunlight to make food.

leaves covered with wrap showed little starch  
sent and uncovered leaves clearly showed starch  
sent, air must be necessary for the food-making  
cess of plants.

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l has something to do with food, ask them  
ight test that idea. If not, ask:

U SUPPOSE PLANTS COULD LIVE IF THEY WERE  
GREEN?

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-24

(211)

Students:

--suggest that they all have leaves, grow in dirt,  
need water, have a stem, are in a pot, are green.

DON'T ASK LEADING  
QUESTIONS

--respond, "Because they have that "green stuff" in  
them."

--respond, "Chlorophyll."

--respond, "Don't know," "Maybe," "Sure, I know  
some that are not green."

ACTIVITY 3-24

MATERIALS

212

TEACHING STRATEGIES

IF A LEAF IS NOT GREEN DO YOU THINK IT WOULD HAVE ANY STARCH IN IT?

Display variegated plant and ask:

HOW IS THIS PLANT DIFFERENT FROM THE PLANTS THAT WE USED IN EARLIER ACTIVITIES?

WHY IS PART OF THE LEAF WHITE?

DO YOU SUPPOSE THAT THIS PLANT HAS STARCH IN IT?

DO YOU THINK THAT THE WHOLE LEAF WILL HAVE STARCH IN IT?

HOW COULD WE FIND OUT?

Distribute a leaf to each student.

BEFORE WE DO THE STARCH TEST, DRAW A PICTURE OF YOUR LEAF AND LABEL THE GREEN AND WHITE PARTS SO THAT YOU CAN REMEMBER WHAT PART WAS GREEN AND WHAT PART WAS WHITE.

As an alternative to drawing, you may wish to permit one or two students to take a picture of the leaf. Mount it on paper and label it to identify the green and white parts. Take another picture after the starch test is made. These two pictures will illustrate the importance of *chlorophyll*.



## TEACHING STRATEGIES

IF IS NOT GREEN DO YOU THINK IT WOULD  
STARCH IN IT?

gated plant and ask:

HIS PLANT DIFFERENT FROM THE PLANTS THAT  
IN EARLIER ACTIVITIES?

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leaf to each student.

E DO THE STARCH TEST, DRAW A PICTURE OF  
F AND LABEL THE GREEN AND WHITE PARTS  
YOU CAN REMEMBER WHAT PART WAS GREEN  
PART WAS WHITE.

## ANTICIPATED STUDENT BEHAVIORS

Students:

--respond, "Yes, because they had starch in them  
after we took the green out."

--observe that the leaves have white edges.

--infer that it must not have any chlorophyll  
in it.

--predict, "Yes," "Probably," "The others did."

--predict, "Yes," "No," "Maybe."

--suggest testing the leaf with the starch test  
solution.

--sketch a leaf.



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ts to take a picture of the leaf. Mount it on  
el it to identify the green and white parts.  
picture after the starch test is made.  
tures will illustrate the importance of

## MATERIALS

## TEACHING STRATEGIES



Instruct students to perform the starch test as in the previous activity.



When all have completed the test, say:

WHAT DID YOU FIND?

WHY DO YOU SUPPOSE THERE IS STARCH ONLY WHERE THE LEAF IS GREEN?

At this time add to The Living Plant Chart the information just collected. Point to the chlorophyll part and ask:

WHAT COULD WE PUT ON OUR CHART THAT WOULD TELL US WHAT CHLOROPHYLL HAS TO DO WITH THE PLANT?



## TEACHING STRATEGIES

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-24

(213)

Students:



Students to perform the starch test as in the activity.



Have completed the test, say:

DID YOU FIND?

DO YOU SUPPOSE THERE IS STARCH ONLY WHERE LEAF IS GREEN?

Time add to The Living Plant Chart the information detected. Point to the chlorophyll part and ask:

COULD WE PUT ON OUR CHART THAT WOULD TELL WHAT CHLOROPHYLL HAS TO DO WITH THE PLANT?

--relate that starch was found only where the leaf was green.

--responses will vary; may suggest that chlorophyll is necessary for the plant to make starch.

--suggest, "It has to be green to make food,"  
"Starch is only in the green part."



ACTIVITY 3-24

214

**MATERIALS**

**TEACHING STRATEGIES**

Appoint or select a volunteer to write this information on the chart referring to the completed chart in Diagram 3-15 for suggested wording. At the same time have one or two selected students arrange a display of all the pictures showing what plants need to make food. Be sure they are arranged in the following sequence: Air + Water + Light + Chlorophyll→Plant Food.

OUR PHOTOGRAPHS ARE DISPLAYED, OUR CHART IS ALL FILLED IN, AND WE HAVE THE INFORMATION WE NEED. WHAT DID WE FIND THAT PLANTS NEED TO MAKE FOOD?

It might help us to remember these things if we wrote it down a special way.

Write:

AIR + WATER + LIGHT + CHLOROPHYLL→PLANT FOOD

LET'S REVIEW SOME OF THE THINGS WE'VE TALKED ABOUT IN CLASS THESE PAST FEW WEEKS. I'M GOING TO ASK YOU SOME QUESTIONS. PLEASE RAISE YOUR HAND TO ANSWER.

IS WATER A FOOD? HOW MANY THINK IT IS?

Record names of students who raise their hands on Tallysheet 3-11 included at the end of this activity.

IS LIGHT A FOOD? HOW MANY THINK IT IS?

Record names on Tallysheet 3-11.

IS AIR A FOOD? HOW MANY THINK IT IS?

Record names on Tallysheet 3-11.

## TEACHING STRATEGIES

or select a volunteer to write this information  
chart referring to the completed chart in Diagram  
suggested wording. At the same time have one or  
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help us to remember these things if we wrote  
a special way.

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WATER A FOOD? HOW MANY THINK IT IS?

mes of students who raise their hands on  
et 3-11 included at the end of this activity.

LIGHT A FOOD? HOW MANY THINK IT IS?

mes on Tallysheet 3-11.

AIR A FOOD? HOW MANY THINK IT IS?

mes on Tallysheet 3-11.

## ANTICIPATED STUDENT BEHAVIORS

Students:

--recall, "Air," "Water," "Light," "Chlorophyll."

--raise hands.

--raise hands.

--raise hands.



## MATERIALS

## TEACHING STRATEGIES

IS SOIL A FOOD? HOW MANY THINK IT IS?

Record names on Tallysheet 3-11.

If more than a few students raised their hands in response to these questions, review, before proceeding, the food = energy concept, and the concept that since air, light, water and soil do not give energy they are not foods. Then ask the questions above once more.

WHERE DO PLANTS GET THE ENERGY TO MAKE FOOD?

IF YOU TRACE EVERY FOOD CHAIN BACK TO THE FIRST THING IN IT, WHAT WOULD IT BE?

WHAT MAKES FOOD FROM AIR, WATER, LIGHT, AND CHLOROPHYLL FOR LIVING THINGS ON EARTH?

Finally go to the chalkboard and write:

HAVE YOU THANKED A GREEN PLANT TODAY?

Ask students to explain what this bumper sticker slogan means. Allow discussion of their interpretations. Use this as a clue to their understanding and appreciation of the previous activities.

## TEACHING STRATEGIES

A FOOD? HOW MANY THINK IT IS?

on Tallysheet 3-11.

a few students raised their hands in response  
stions, review, before proceeding, the food =  
pt, and the concept that since air, light,  
il do not give energy they are not foods.  
questions above once more.

DO PLANTS GET THE ENERGY TO MAKE FOOD?

TRACE EVERY FOOD CHAIN BACK TO THE FIRST  
N IT, WHAT WOULD IT BE?

KEES FOOD FROM AIR, WATER, LIGHT, AND  
HYLL FOR LIVING THINGS ON EARTH?

o the chalkboard and write:

U THANKED A GREEN PLANT TODAY?

to explain what this bumper sticker slogan  
w discussion of their interpretations. Use  
ue to their understanding and appreciation of  
activities.

## ANTICIPATED STUDENT BEHAVIORS

ACTIVITY 3-24

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Students:

--raise hands.

--respond, "From the sun."

--respond, "Plants," "The sun."

--respond, "Green plants."

Teacher \_\_\_\_\_  
Date \_\_\_\_\_

UNIT III, CORE D  
TALLYSHEET 3-11: Tally of Student Answers to Oral Questions  
ACTIVITY 3-24: "The Green Machine"

- As you ask students in the last part of Activity 3-24 to raise their hands if they think water, light, air, or soil are a food for plants, make a check in the appropriate column for each student who thinks one or more of these is a food.
- Retain and use the other side of this tallysheet to summarize Worksheet 3-20 in Activity 3-25.

	1 Is Water A Food?		2 Is Light A Food?		3 Is Air A Food?		4 Is Soil A Food?	
	Yes	No	Yes	No	Yes	No	Yes	No
Attach ID list here.	01							

TOTALS:

# TALLY SHEET 3-11: Tally of Worksheet 3-20

Circle each item the student marked on his worksheet. Then total the number of correct responses for each student and the number of students correctly responding to each item. Consider whether the whole group needs further review of particular concepts or if some students need additional help.

KEY:	Bottom left										Total Correct
	1	2	3	4	5	6	7	8	9	10	
Attach ID list here.	1	2	3	4	5	6	7	8	9	10	
	1	2	3	4	5	6	7	8	9	10	A B C D
	1	2	3	4	5	6	7	8	9	10	A B C D
	1	2	3	4	5	6	7	8	9	10	A B C D
	1	2	3	4	5	6	7	8	9	10	A B C D
	1	2	3	4	5	6	7	8	9	10	A B C D
	1	2	3	4	5	6	7	8	9	10	A B C D
	1	2	3	4	5	6	7	8	9	10	A B C D
	1	2	3	4	5	6	7	8	9	10	A B C D
	1	2	3	4	5	6	7	8	9	10	A B C D
	1	2	3	4	5	6	7	8	9	10	A B C D
	1	2	3	4	5	6	7	8	9	10	A B C D
	1	2	3	4	5	6	7	8	9	10	A B C D
	1	2	3	4	5	6	7	8	9	10	A B C D
	1	2	3	4	5	6	7	8	9	10	A B C D
	1	2	3	4	5	6	7	8	9	10	A B C D
	1	2	3	4	5	6	7	8	9	10	A B C D
	1	2	3	4	5	6	7	8	9	10	A B C D
	1	2	3	4	5	6	7	8	9	10	A B C D
	1	2	3	4	5	6	7	8	9	10	A B C D

Does this review give an accurate indication of student understanding?  
If not, what other evidence do you have of student learning?

☐ Yes ☐ No

UNIT III, CORE D  
ACTIVITY 3-24: "The Green Machine"

Activity name suggested by class:

Teacher

BSCS USE:		Post	Tally	Rev	
Day 1	Day 2	Day 3	Day 4	Day 5	Day 6

1.	Date taught (month and date, e.g. 11/2)					
2.	Minutes of class time on science each day					
3.	Minutes of preparation each day					
4.	Students absent on each date (Use ID Number)					

5. Interest of class as expressed by apparent attention to what is happening.Number of students responding with: Name students you noted especially:  
(Number)

HIGH INTEREST	_____
MODERATE INTEREST	_____
INDIFFERENCE	_____
MODERATE RESISTANCE	_____
STRONG DISLIKE	_____
HARD TO RATE	_____

6. Equipment in kit: ☐ None ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use
7. Equipment I got: ☐ None needed ☐ Easy to get but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:	Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: Omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:
10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:
11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:
12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?
13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:
14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:

☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless

--keep as is revision suggested major changes described --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

Equipment I got: ☐ None ☐ Easy ☐ Hard to get, ☐ Hard to get, ☐ Unobtainable,  
needed to get but okay add to kit add to kit

Materials used:	Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

8. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:  
10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:  
11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No -Pages and Problem:  
12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No -Why not?  
13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:  
14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:  
15. Your rating of this activity:  
☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless  
--keep as is revision suggested major changes described --drop it  
SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed.  
What parts of this activity should be retained when the curriculum is revised?  
Page(s) \_\_\_\_\_:

17. Please record student answers on Tallysheet 3-11 to the questions of whether water, light, air, or soil are foods. Retain the tallysheet to use in Activity 3-25.

18. Have a student take pictures of the completed Living Plant Chart and of their display of the experiment photographs and send them in with this worksheet.

19. Concern (or questions) about content:

20. Messages for staff (read immediately):

BSCS Evaluation: EMH Feedback Form 1c

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?



Teacher \_\_\_\_\_

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.



## Me and my Environment

### OBJECTIVE FOCUS FOR THIS ACTIVITY

#### UNIT GOALS:

1. Realize and appreciate the energy inter-relationships between organisms.
2. Appreciate and understand man's dependence on green plants for food.

#### CORE D OBJECTIVES:

1. Determine that plants contain food.
2. Conclude that plants can make their own food when certain environmental conditions prevail.
3. Infer that the sun provides the energy upon which man and other life depends.
4. Determine that in the absence of light, plants are unable to make food.
5. Determine that without air, plants are unable to make food.
6. Determine that in the absence of "green stuff" (chlorophyll), plants are unable to make food.
7. Appreciate the role of green plants in supplying food to the remainder of the living world.

### MATERIALS

### TEACHING STRATEGIES

#### Activity 3-25. Review Of Success

*The eleven questions in this review of success check on students' understanding of the importance of plants as well as the ability to read a graph. Discussion of these*

**FOCUS FOR THIS ACTIVITY**

**GOALS:**

1. Realize and appreciate the energy inter-relationships between organisms.
2. Appreciate and understand man's dependence on green plants for food.

**OBJECTIVES:**

1. Determine that plants contain food.
2. Conclude that plants can make their own food when certain environmental conditions prevail.
3. Infer that the sun provides the energy upon which man and other life depends.
4. Determine that in the absence of light, plants are unable to make food.
5. Determine that without air, plants are unable to make food.
6. Determine that in the absence of "green stuff" (chlorophyll), plants are unable to make food.
7. Appreciate the role of green plants in supplying food to the remainder of the living world.

**TEACHING STRATEGIES**

**25. Review Of Success**

Questions in this review of success check on understanding of the importance of plants as food sources. Discussion of these

**UNIT III.**

**ENERGY RELATIONSHIPS  
IN MY ENVIRONMENT**

**CORE D.**

**FOOD MAKING IN PLANTS**



**BSCS**

**ACTIVITY 3-25. REVIEW OF SUCCESS**

**ANTICIPATED STUDENT BEHAVIORS**

At the end of this activity, each student should:  
--have answered each of the questions on Worksheet 3-20.

# ACTIVITY 3-25

## MATERIALS

## TEACHING STRATEGIES

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Worksheet 3-20  
Slides 3-41 and 3-42  
\*35mm Slide projector

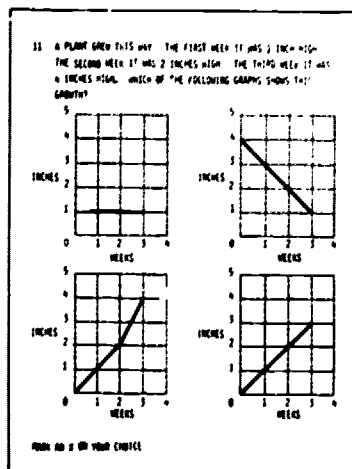
### Slide 3-41

Date \_\_\_\_\_ Name \_\_\_\_\_

PLACE AN X IN THE BLANK IN FRONT OF ANY STATEMENT THAT IS TRUE ABOUT PLANTS

- \_\_\_\_\_ 1. PLANTS GET THEIR ENERGY FROM THE SOIL
- \_\_\_\_\_ 2. PLANTS GET THEIR ENERGY FROM WATER
- \_\_\_\_\_ 3. PLANTS USE ENERGY FROM SUNLIGHT
- \_\_\_\_\_ 4. PLANTS DON'T NEED ANY FOOD
- \_\_\_\_\_ 5. PLANTS MAKE THEIR OWN FOOD
- \_\_\_\_\_ 6. PLANTS NEED SOMETHING FROM THE AIR TO GROW
- \_\_\_\_\_ 7. PLANTS IN THE SOIL CAN MAKE THEIR OWN FOOD
- \_\_\_\_\_ 8. PLANTS NEED WATER TO LIVE
- \_\_\_\_\_ 9. ANIMALS WOULD DIE IF THERE WERE NO PLANTS
- \_\_\_\_\_ 10. PEOPLE WOULD DIE IF THERE WERE NO PLANTS

### Slide 3-42



questions provides opportunities for you to provide the students with positive reinforcement and to give assistance to those who need it.

As you distribute Worksheet 3-20 have each student put his name and the date on it.

Say:

TODAY LET'S THINK ABOUT SOME OF THE THINGS WE HAVE LEARNED ABOUT PLANTS. I WILL HAND OUT A WORKSHEET OF QUESTIONS. AS I READ EACH OF THE QUESTIONS, MARK YOUR OWN ANSWERS BUT DON'T TELL OTHERS WHAT YOU MARK. WE WILL TALK ABOUT YOUR ANSWERS WHEN ALL OF YOU HAVE FINISHED THE WORKSHEET. ARE THERE ANY QUESTIONS?

Project Slide 3-41 and read the instructions. Then say:

I WILL READ EACH OF THE STATEMENTS ONCE, REPEAT IT A SECOND TIME, AND THEN GIVE YOU TIME TO ANSWER.

Project Slide 3-42 and have students turn their worksheets over. Read the question aloud twice. When all have answered, collect the worksheets. Then project each slide and have the students discuss each answer.

After class, tally the students' answers on Tallysheet 3-11. Use this information in planning to teach Core A of Unit IV, which expands the concepts of food chains and webs to develop the concept of transferring energy and matter through environmental systems.

\*Not furnished in materials kit

### TEACHING STRATEGIES

provides opportunities for you to provide the with positive reinforcement and to give assistance who need it.

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AVE LEARNED ABOUT PLANTS. I WILL HAND  
A WORKSHEET OF QUESTIONS. AS I READ  
OF THE QUESTIONS, MARK YOUR OWN ANSWERS  
DON'T TELL OTHERS WHAT YOU MARK. WE  
TALK ABOUT YOUR ANSWERS WHEN ALL OF  
HAVE FINISHED THE WORKSHEET. ARE THERE  
QUESTIONS?

lide 3-41 and read the instructions. Then say:

LL READ EACH OF THE STATEMENTS ONCE,  
AT IT A SECOND TIME, AND THEN GIVE YOU  
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lide 3-42 and have students turn their  
s over. Read the question aloud twice. When  
answered, collect the worksheets. Then project  
e and have the students discuss each answer.

s, tally the students' answers on Tallysheet  
this information in planning to teach Core A  
, which expands the concepts of food chains and  
ve e concept of transferring energy and  
ou ironmental systems.

### ANTICIPATED STUDENT BEHAVIORS

At the end of this activity, each student should:

- have discussed what plants need and their importance.
- have discussed graphs and their use.

UNIT III, CORE D  
ACTIVITY 3-25: "Review Of Success"

Activity name suggested by class: \_\_\_\_\_

Teacher

BSCS USE: Post \_\_\_\_\_ Tally \_\_\_\_\_ Rev \_\_\_\_\_  
Day 1 Day 2 Day 3 Day 4 Day 5 Day 6

1.	Date taught (month and date, e.g. 11/2)						
2.	Minutes of class time on science each day						
3.	Minutes of preparation each day						
4.	Students absent on each date (Use ID Number)						

5. Interest of class as expressed by apparent attention to what is happening.Number of students responding with: \_\_\_\_\_ Name students you noted especially: \_\_\_\_\_  
(Number)

HIGH INTEREST	_____
MODERATE INTEREST	_____
INDIFFERENCE	_____
MODERATE RESISTANCE	_____
STRONG DISLIKE	_____
HARD TO RATE	_____

6. Equipment in kit: ☐ None ☐ Satisfactory ☐ Too fragile ☐ Too complicated ☐ Difficult to use7. Equipment I got: ☐ None ☐ Easy to get ☐ Hard to get, but okay ☐ Hard to get, add to kit ☐ Unobtainable, add to kit

8. Materials used:	Worksheet #	Game #	Slides (show slide nos.)	Transparency #	Card(s) #	Tape(s) #	Other #
Worthwhile as is							
Revise slightly							
Revise much							
Worthless: omit							

9. Maturity level is ☐ just right ☐ too childish ☐ too mature Explain:10. Vocabulary level is ☐ just right ☐ too easy ☐ too difficult Explain:11. Were teacher instructions clear enough to follow? ☐ Yes ☐ No - Pages and Problem:12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:

15. Your rating of this activity:

☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless  
--keep as is revision suggested major changes described --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

Equipment I got: ☐ None ☐ Easy ☐ Hard to get, ☐ Hard to get, ☐ Unobtainable,  
needed to get but okay add to kit add to kit

Materials used:	Worksheet # ! #	Game #	Slides (show slide nos.)	Transparency # ! #	Card(s) #	Tape(s) #	Other #
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12. Were clues to success and reviews of success helpful? ☐ Yes ☐ No - Why not?
13. Did the activity fulfill the purpose stated by the Guide? ☐ Yes ☐ No - Comment:
14. Were any parts of this activity omitted? ☐ No ☐ Yes - Explain:
15. Your rating of this activity:  
☐ Worthwhile ☐ Of value--needs the ☐ Worth salvaging--make ☐ Worthless  
--keep as is revision suggested major changes described --drop it

SPECIFIC CONCERNS ABOUT THIS ACTIVITY:

16. There are always parts of activities that are good and need not be changed.  
What parts of this activity should be retained when the curriculum is revised?  
Page(s) \_\_\_\_\_:

17. Did any student give away the answer to any question on Worksheet 3-20?  
☐ No ☐ Yes: Which?

18. Please tabulate each student's responses on Tallysheet 3-11 and send it in with this feedback sheet.

19. Concern (or questions) about content:

20. Messages for staff (read immediately):

BSCS Evaluation: EMH Feedback Form 1c

Have you answered each question, attached annotated Guide, your revisions, student work, etc.?

Teacher \_\_\_\_\_

REPORT OF WHAT HAPPENED AND SUGGESTIONS FOR REVISION

1. Whenever practical write all over your second copy of the Guide. Tear out the activity and send the annotated Guide in with this form.
2. Make specific suggestions - exactly what you think should appear in the Guide.
3. Tell us what you did. Think of what you needed, what you had to work out for yourself, how you presented something to make it go over.
4. Describe the revisions you said were needed in answering the questions on the other side of this form.
5. As a reminder of things that help in revision, read through the following list and check off things you want to be sure to note this time. (We know you can't tell about everything every time!)

THE LESSON

- ☐ how you organized materials or class.
- ☐ things added (a question, a picture, etc.).
- ☐ equipment, supplies, visual aids.
- ☐ things that went wrong, misunderstandings.
- ☐ what you would do differently or avoid next time.
- ☐ turmoil in the class caused by the activity, or disruptive students, or interruptions, and how you dealt with them.

THE STUDENTS

- ☐ who had problems and what they were.
- ☐ how someone "caught on" (or who never did).
- ☐ who was really "turned off" (or on).
- ☐ reactions of parents, teachers, students.
- ☐ special evidence of learning or applying ideas.



UNIT III  
REACTIONS TO CORE D

1. Was the background information for this core adequate? ☐ Yes ☐ No  
Comment:
  
2. Was it clear to you why these particular activities were chosen and the direction they were leading? ☐ Yes ☐ No  
Comment:
  
3. Did the activities fulfill the purposes stated in the Guide for this core? ☐ Yes ☐ No  
Comment:
  
4. How would you increase the clarity of this core for students? (Help them understand why they are doing these activities.)
  
5. Is there a practical (take-home) value for your students in these activities? ☐ Yes ☐ No
6. If yes, what do you see as the "take-home" lesson? If no, what is needed?
  
7. In these materials, what things did your students find difficult to do?
  
8. Should there be more clues to success or reviews of success in this core? ☐ Yes ☐ No  
Comment:
  
9. Was there too much reading and too many teacher directions? ☐ Yes ☐ No  
Comment:
  
10. Did you make use of the Planning Guide? ☐ Yes ☐ No  
Comment:

Is there a practical (take-home) value for your students in these activities? ☐ Yes ☐ No  
If yes, what do you see as the "take-home" lesson? If no, what is needed?

7. In these materials, what things did your students find difficult to do?

8. Should there be more clues to success or reviews of success in this core? ☐ Yes ☐ No  
Comment:

9. Was there too much reading and too many teacher directions? ☐ Yes ☐ No  
Comment:

10. Did you make use of the Planning Guide? ☐ Yes ☐ No  
Comment:

11. If you could teach your way, rather than following the Guide, how would you do it?

12. Which of your students do you believe were unsuccessful in achieving the objectives of this core of activities? Explain.

BSCS Evaluation: EMH Feedback Form 2a

# NEW STUDENTS ENTERING DURING THIS CORE

Date Entered	Last Name	Name Used	Ethnic Group	Sex	Birthdate	Test date	Test	Total
			W B S O	M F			W B O	
			W B S O	M F			W B O	
			W B S O	M F			W B O	
			W B S O	M F			W B O	

## STUDENTS DROPPED IN THIS PERIOD

Date Dropped	Last Name	First

W = white  
 B = black  
 S = Spanish-American  
 O = other

W = WISC  
 B = Binet  
 O = other (name)

ADDITIONAL INFORMATION ON NEW STUDENTS:

NEW STUDENTS ENTERING DURING THIS CORE

Group	Sex	Birthdate	Test date	Test	Total	Verbal	Performance	Previous Test Score
AS O	M F			W B O				
S O	M F			W B O				
S O	M F			W B O				
S O	M F			W B O				

W = WISC  
 B = Binet  
 O = other  
 (name)